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ABSTRACT

This document contains 48 papers from a conference on agricultural education research. The following papers are among those included: "Analysis of the Relationships between Computer Experiences, Self-Efficacy, and Knowledge of Undergraduate Students Entering a Land-Grant College of Agriculture" (Donald M. Johnson, Melissa L. Lester, James A. Ferguson); "Learning Communities and Agricultural Youth Organizations" (Anna L. Ball, Bryan L. Garton, James E. Dyer); "Utilizing Professional Development to Ensure International Assignment Impact" (Nick T. Place, Steven G. Jacob, Mary P. Andrews, Nancy E. Crago); "What Stakeholders Want from the Land-Grant University" (Kathleen D. Kelsey, Seburn L. Pense); "Engaging Students in the Agricultural Education Model" (B. Allen Talbert, Mark A. Balschweid); "A Comparison of Student Teachers' Perceptions of Important Elements of the Student Teaching Experience before and after Completing an 11-Week Field Experience" (Julie F. Harlin, M. Craig Edwards, Gary E. Briers); "Characteristics of Preservice Teacher Education Programs in Agricultural Education in the United States" (James J. Connors, John P. Mundt); "A Five-Year Longitudinal Examination of Faculty Needs Associated with Agricultural Distance Education" (Tim H. Murphy, Kim E. Dooley); "An Analysis of the Perceived Benefits and Affordances of Course Websites by Agricultural Students and Faculty Members" (Tim H. Murphy); "Competencies for the Distance Education Professional" (Kim E. Dooley, James R. Lindner); "Impact of an Asynchronous Activity on Academic Achievement of Abstract Leadership Concepts" (Barry L. Boyd, Theresa Pesl Murphrey, James F. Rogers); "Factors

Associated with Research Productivity of Agricultural Education Faculty" (Joe W. Kotrlik, James E. Bartlett, Chadwick C. Higgins, Heather A. Williams); "Structuring Agricultural Education Research Using Conceptual and Theoretical Frameworks" (James E. Dyer, Penny S. Haase, Shannon Washburn); "An Assessment of Student Agricultural Literacy Knowledge Based on the Food and Fiber Systems Literacy Framework" (James G. Leising, Seburn L. Pense, Carl G. Igo); "High School Agricultural Communications Competencies" (Cindy Akers, Paul R. Vaughn, Jacqui D. Lockaby); "Desktop Videoconferencing" (John Kessell, Greg Miller); "Escalation Model for Instructional Supervisors in Agricultural Education" (Carrie Fritz, Greg Miller); "The Influence of Foundational and Expressed Values on Teacher Behavior" (Jacqui Lockaby, Matt Baker, Jon A. Hogg); and "Women in Agricultural Education" (Billye Foster). Most papers include substantial bibliographies. (MN)

28th Annual National Agricultural Education Research Conference

NAERC 2001
New Orleans, Louisiana
December 12
Research:
Accomplishments
Opportunities
Challenges

1

December 12, 2001 ~ The New Orleans Marriot Hotel

Co-Chair & Co-Editor: Joe W. Kotrlik, Louisiana State University
Co-Chair & Co-Editor: Michael F. Burnett, Louisiana State University

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Opening General Session - Room: Balcony L, N - 8:00-8:25a.m.

Theme:	Orientation to NAERC 2001
Co-Chairs:	Joe W. Kotrlik, Louisiana State University
	Michael F. Burnett, Louisiana State University
Facilitators:	Mark Balschweid, Purdue University
	Neil Knobloch, The Ohio State University

Concurrent Session A - 8:30-10:00a.m. - Bonaparte Room

Theme:	College of Agriculture Issues
Chair:	Billye Foster, University of Arizona
Discussion Leader:	Rick Rudd, University of Florida
Facilitator:	Marty Frick, Montana State University
	Paul Theriot, Louisiana State University

Concurrent Session B - 8:30-10:00a.m. - Bacchus Room

Theme:	Youth Organizations
Chair:	Andrew Baker, Western Illinois University
Discussion Leader:	Lance Kieth, Texas Tech University
Facilitators:	Kyle McGregor, Texas Tech University

Concurrent Session C - 8:30-10:00 a.m. - Regent Room

Theme:	Preservice Teacher Education
Chair:	Richard Joerger, University of Minnesota
Discussion Leader:	Robert Martin, Iowa State University
Facilitator:	Van Shelhamer, Montana State University Penny Haase-Wittler, University of Missouri

Concurrent Session D - 8:30-10:00a.m. - Iberville 1 Room

Theme:	**E-Learning**
Chair:	**Greg Miller, Iowa State University**
Discussion Leader:	**Jacqueline Deeds, Mississippi State University**
Facilitator:	**Wayne Fanno, Oregon State University** **Brad Greiman, University of Missouri**

Concurrent Session E - 10:30-12:00a.m. - Bonaparte Room

Theme:	**Research Methods & Design**
Chair:	**Jim Flowers, North Carolina State University**
Discussion Leader:	**Connie Baggett, The Pennsylvania State University**
Facilitator:	**Kristina Boone, Kansas State University** **Elizabeth Wilson, North Carolina State University**

- The Handling of Nonresponse in Agricultural Education - James R. Lindner, Tim H. Murphy, Gary E. Briers, Texas A&M University (pp. 233-245)

Concurrent Session F - 10:30-12:00a.m. - Bacchus Room

Theme:	Curriculum Issues
Chair:	Steven Harbstreit, Kansas State University
Discussion Leader:	Carol Conroy, Cornell University
Facilitator:	Chad Aucoin, Louisiana State University Chad Davis, Texas Tech University

- Agricultural Education Competencies and Progress Towards a Doctoral Degree - James R. Lindner, Kim E. Dooley, Texas A&M University (pp. 246-258)
- An Assessment of Student Agricultural Literacy Knowledge Based on the Food and Fiber Systems Literacy Framework - James G. Leising, Oklahoma State University'; Seburn L. Pense, Southwest Texas State University; Carl Igo, Oklahoma State University (pp. 259-268)
- Are We Preparing the Society Ready Graduate? - Donna L. Graham, University of Arkansas (pp. 269-281)
- High School Agricultural Communications Competencies: A National Delphi Study - Cindy Akers, Texas Tech University; Paul Vaughn, University of Missouri; Jacqui D. Lockaby, Texas Tech University (pp. 282-294)

Concurrent Session G - 10:30-12:00a.m. - Regent Room

Theme:	Administration/Supervision Issues
Chair:	Jerry Peters, Purdue University
Discussion Leader:	Rob Terry, Oklahoma State University
Facilitator:	Dave Howell, University of New Hampshire Weston Dale Walker, University of Missouri

- An Examination of Texas Agricultural Education Safety Program Procedures - Doug R. Ullrich, Sam Houston State University; Daniel J. Hubert, Utah State University; James R. Lindner, Texas A&M University; Tim H. Murphy, Texas A&M University; J. Torey Nalbone, Sam Houston State University (pp. 295-307)
- Desktop Videoconferencing: An Effective tool for Communication and Instructional Supervision - John Kessell, Greg Miller, Iowa State University (pp. 308-319)
- Escalation Model for Instructional Supervisors in Agricultural Education - Carrie Fritz, Greg Miller, Iowa State University (pp. 320-332)
- Job Satisfaction of Civil Service and Administrative and Professional Staff in a College of Food, Agricultural and Environmental Sciences - Rosemary R. Gliem, Joseph A. Gliem, The Ohio State University (pp. 333-346)

Concurrent Session H - 10:30-12:00a.m. - Iberville 1 Room

Theme:	Contemporary Issues in Agricultural Education
Chair:	Nick Place, University of Florida

Discussion Leader:	Lloyd Bell, University of Nebraska-Lincoln
Facilitator:	Todd Brashears, Texas Tech University Robin Peiter, Oklahoma State University

- Agricultural Education in An Elementary School: An Ethnographic Study of a School Garden - Laurie Thorp, Christine Townsend, Texas A&M University (pp. 347-360)
- Teaching Biology Using Agriculture as the Context: Perceptions of High School Students - Mark A. Balschweid, Purdue University (pp. 361-373)
- The Influence of Foundational and Expressed Values on Teacher Behavior - Jacqui Lockaby, Matt Baker, Jon A. Hogg, Texas Tech University (pp. 374-383)
- Women in Agricultural Education: Who Are You? - Billye Foster, The University of Arizona (pp. 384-395)

Concurrent Session I - 1:30-3:00p.m. - Bonaparte Room

Theme:	The Perspectives of High School Agricultural Science Teachers
Chair:	Allen Talbert, Purdue University
Discussion Leader:	Chris Townsend, Texas A&M University
Facilitator:	Antoine Alston, North Carolina A&T University Steve Fraze, Texas Tech University

- A Comparison of the Professional Development Needs of Kansas and Missouri Teachers of Agriculture - Shannon G. Washburn, Brad O. King, Bryan L. Garton, University of Missouri; Steven R. Harbstreit, Kansas State University (pp. 396-408)
- Agricultural Educators' Knowledge and Perception of Agricultural Biotechnology Curriculum - Elizabeth Wilson, Barbara Kirby, James L. Flowers, North Carolina State University (pp. 409-421)
- Integrating Science Into Agricultural Education: A Survey of South Carolina Teachers' Perceptions - K. Dale Layfield, V. Christine Minor, Jerry A. Waldvogel, Clemson University (pp. 422-432)
- Perceptions of Agricultural Education Teachers Toward Sustainable Agricultural Practices - Maurice Udoto, James L. Flowers, North Carolina State University (pp. 433-444)

Concurrent Session J - 1:30-3:00p.m. - Bacchus Room

Theme:	View of Agricultural Education Among Stakeholder Groups
Chair:	Al Mannebach, University of Connecticut
Discussion Leader:	Gary Jackson, Mississippi State University
Facilitator:	Randall Andreasen, Southwest Missouri State University Anna Melodia, National FFA Organization

- Attitudes of Arkansas Daily Newspaper Editors Toward Agriculture - D. Dwayne Cartmell II, Oklahoma State University; James E. Dyer, University of Florida; Robert J. Birkenholz, University of Missouri (pp. 445-458)
- North Carolina Home School Providers' Perceptions of Agricultural Education - R. Jason Walls, James L. Flowers, Gary E. Moore, North Carolina State University (pp. 459-470)

Concurrent Session K - 1:30-3:00p.m. - Regent Room

Theme:	**Adult Education**
Chair:	**James Christiansen, Texas A&M University**
Discussion Leader:	**Gary Leske, University of Minnesota**
Facilitator:	**Marcus Comer, University of Missouri** **David Lawver, Texas Tech University**

Concurrent Session L - 1:30-3:00p.m. - Iberville 1 Room

Theme:	**Teaching/Learning Research**
Chair:	**Barry Boyd, Texas A&M University**
Discussion Leader:	**Bill Camp, Virginia Tech University**
Facilitator:	**David Carter, Louisiana State University** **Mark Kistler, Texas A&M University**

NAERC Closing General Session - 3:30-4:30p.m. - Balcony L, N

Theme:	Research: Accomplishment, Opportunities, Challenges
Co-Chairs:	Joe W. Kotrlik, Louisiana State University Michael F. Burnett, Louisiana State University
Facilitator:	Shannon Washburn, University of Missouri
Speaker:	Research in Agricultural Education and Communication: Observations of a Colleague - Jimmy G. Cheek, Dean, Academic Programs, Institute for Food and Agricultural Sciences, University of Florida

Poster Session - American Association for Agricultural Education

Poster Session Presentations

The Purposes of the National Agricultural Education Research Conference

The purposes of the National Agricultural Education Research Meeting were stated by Al Mannebach of the University of Connecticut in his preface to the 1987 National Agricultural Education Research Meeting Proceedings. Those purposes have not been included in the proceedings for several years and they are worthy of being stated again. They included:

1. To present and disseminate the most recent and best research on the national level as judged by referees.
2. To present and disseminate critiques of the research by researchers in the profession.
3. To provide a forum for discussion of methodology and results.
4. To provide feedback to authors regarding research procedures and methodology used.
5. To provide suggestions to authors for preparing manuscripts for publication.
6. To give novice researchers an overview of current research issues, methodology, and critique within the profession.
7. To improve the quality of research conducted in future years.
8. To identify and recognize the Outstanding Paper Presentation at the National Agricultural Education Research Conference on an annual basis.
9. To provide a written record of quality research completed and professional critiques over time.
10. To broaden horizons and chart new directions for the conduct of agricultural education research in the future.

28TH NATIONAL AGRICULTURAL EDUCATION RESEARCH CONFERENCE

New Orleans, Louisiana - December 12, 2001

Theme:
Research -- Accomplishments, Opportunities, Challenges

CALL FOR PAPERS

WHAT TO SEND:

- § Four copies of the manuscript (no cover page)
- § One separate copy of the cover page that includes the name, mailing address, phone number, fax number, and e-mail address of all authors

FORMAT:

- § 13 page maximum including abstract/tables/figures/references, plus cover page
- § Single-spaced
- § 12 point Times Roman or Times New Roman font
- § All margins - 1 inch
- § All tables/figures placed within the body of the paper as soon after their first mention in the text as possible
- § Use the table functions command for all tables
- § Center page numbers at the bottom of all pages
- § Manuscript title should be centered and all caps
- § Place abstract after manuscript title – 400 words maximum
- § Main body of manuscript should come immediately after the abstract
- § Suggested Paper Sections: Introduction/Theoretical Framework, Purpose(s)/Objective(s), Methods/Procedures, Results/Findings, Conclusions/Recommendations/Implications, References

STYLE: APA 4th Edition

DEADLINE: Postmarked by June 1, 2001

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NAERC 2001 Web Page: http://www.lsu.edu/hrleader/naerc2001

The Peer Review Process

The National Agricultural Education Research Conference (NAERC) is the premier professional event in which research in agricultural education is communicated orally and in written form to the profession. Agricultural education professionals from throughout the United States and around the world submit their most recent research for presentation at the annual research conference.

Each paper proposal was sent to three agricultural educators as part of the blind review process. Only papers receiving the most favorable reviews were accepted for presentation at NAERC and for publication in the proceedings. 117 paper proposals were submitted for review by the postmark date of June 1, 2001. The distinguished group of 58 agricultural educators listed in the table below served as paper reviewers.

Based on the reviewers' recommendations, the top 48 papers were accepted for presentation at the 2001 NAERC. The review process resulted in an acceptance rate of 40%. The agricultural educators who served as manuscript reviewers are listed below.

2001 National Agricultural Education Research Conference Manuscript Reviewers

Matt Baker	Texas Tech University
Mark Balschweid	Purdue University
Kirby Barrick	University of Illinois, Urbana-Champagne
Kristina Boone	Kansas State University
Blannie Bowen	The Pennsylvania State University
Barry Boyd	Texas A&M University
Gary Briers	Texas A&M University
Stanley Burke	Virginia Tech University
Bill Camp	Virginia Tech University
Jim Connors	The Ohio State University
Carol Conroy	Cornell University
Jacquelyn Deeds	Mississippi State University
Kim Dooley	Texas A&M University
Craig Edwards	University of Georgia
Jack Elliot	The University of Arizona
Jim Flowers	North Carolina State University
Bryan Garton	University of Missouri
Rosemary Gliem	The Ohio State University
Joe Harper	University of Illinois, Urbana-Champagne
Ray Herren	University of Georgia
John Hillison	Virginia Tech University
Tracy Hoover	The Pennsylvania State University
Dan Hubert	Utah State University

2001 National Agricultural Education Research Conference
Manuscript Reviewers

Patreese Ingram	The Pennsylvania State University
Maynard Iverson	The University of Georgia
Barbara Kirby	North Carolina State University
David Lawver	Texas Tech University
Dale Layfield	Clemson University
James Lindner	Texas A&M University
Vernon Luft	University of Nevada, Reno
Al Mannebach	University of Connecticut
Robert Martin	Iowa State University
Greg Miller	Iowa State University
Wade Miller	Iowa State University
Jeff Moss	University of Illinois, Urbana-Champagne
John Mundt	University of Idaho-Boise Center
Tim Murphy	Texas A&M University
Nick Place	University of Florida
Rick Rudd	University of Florida
Dennis Scanlon	The Pennsylvania State University
Brenda Seevers	New Mexico State University
Van Shelhamer	Montana State University
Bob Stewart	University of Missouri
Mike Swan	Washington State University
Kirk Swortzel	Mississippi State University
Allen Talbert	Purdue University
Walter Taylor	Mississippi State University
Rob Terry	Oklahoma State University
Greg Thompson	Oregon State University
Robert Torres	New Mexico State University
Chris Townsend	Texas A&M University
Cary Trexler	Iowa State University
Susan Fritz	University of Nebraska
George Wardlow	University of Arkansas
Susie Whittington	The Ohio State University
David Williams	Iowa State University
Gary Wingenbach	Mississippi State University
Mark Zidon	University of Wisconsin- Platteville

National Agricultural Education Research Conference
Locations and Chairs

Year	NAERC Chair(s)	Institution	NAERC Location
2001	Joe W. Kotrlik	Louisiana State University	New Orleans, LA
	Michael F. Burnett	Louisiana State University	
2000	Greg Miller	Iowa State University	San Diego, CA
1999		University of Florida	Orlando, FL
1998	Gary Moore	North Carolina State University	New Orleans, LA
	James Flowers	North Carolina State University	
1997	James J. Connors	University of Idaho	Las Vegas, NV
	Tim H. Murphy	University of Idaho	
1996	George W. Wardlow	University of Arkansas	Cincinnati, OH
	Donald M. Johnson	University of Arkansas	
1995	Leon G. Schumacher	University of Missouri	Denver, CO
	Robert J. Birkenholz	University of Missouri	
1994	David E. Lawver	Texas Tech University	Dallas, TX
	Robert Terry, Jr.	Texas A & M University	
1993	Dennis Scanlon	The Pennsylvania State University	Nashville, TN
	Thomas H. Bruening	The Pennsylvania State University	
1992	John P. Mundt	University of Idaho	St. Louis, MO
1991	Larry R. Arrington	University of Florida	Los Angeles, CA
1990	Robert A. Martin	Iowa State University	Cincinnati, OH
1989	Michael F. Burnett	Louisiana State University	Orlando, FL
1988	Edgar P. Yoder	The Pennsylvania State University	St. Louis, MO
1987	Alfred J. Mannebach	University of Connecticut	Las Vegas, NV
1986	Alan A. Kahler	Iowa State University	Dallas, TX
1985	Bob Stewart	University of Missouri	Atlanta, GA
1984	Jimmy Cheek	University of Florida	New Orleans, LA

National Agricultural Education Research Conference
Locations and Chairs

Year	NAERC Chair(s)	Institution	NAERC Location
1983	Paul R. Vaughn	New Mexico State University	Anaheim, CA
1982	Dale Oliver	Virginia Tech	St. Louis, MO
1981	Maynard Iverson	North Carolina State University	Atlanta, GA
1980	L. H. Newcomb	The Ohio State University	New Orleans, LA
1979	Ronald Brown	Mississippi State University	Anaheim, CA
1978	Bennie Byler	Mississippi State University	Dallas, TX
1977	William Richardson	Purdue University	Atlantic City, NJ
1976	Glen Shinn	Mississippi State University	Houston, TX
1975	Hollie Thomas	Florida State University	Anaheim, CA
1974	Hollie Thomas	Florida State University	New Orleans, LA

Acknowledgments

The National Agricultural Education Research Conference requires the efforts of hundreds of individuals. Most notable among these are the paper reviewers, paper discussants, session chairs, and session facilitators, keynote speakers, each of the paper authors who submitted their work for consideration, and registration staff. Appreciation is extended to each of these individuals.

Appreciation is extended to the the faculty and staff in the School of Human Resource Education and Workforce Development at Louisiana State University for their work and support of NAERC 2001. The NAERC Conference requires many hours of work on the part of the departmental staff and the conference would not be possible without the support of these individuals.

Sandra Cash is the Office Coordinator for the School and we appreciate her work coordinating the NAERC 2001 related activities of the student workers in the main office. The following student workers developed, edited, and produced materials for the conference under Sandra's supervision and this support was greatly appreciated: Alison Bode, Misty Beard, Alicia Broussard, Lauren Cutrer, Lori Henry, Jennifer Jaubert, and Mary Claire Mathews.

We thank graduate assistants Chad Aucoin, David Carter, Myriah Clark, and Paul Theriot, and also Brad Leger, Louisiana FFA Executive Secretary, for providing assistance with registration and other support for NAERC 2001. Special thanks is extended to Frankie Gould and the Agricultural Publications Department staff of the LSU Agricultural Center for designing the graphics for NAERC 2001 and duplicating the compact discs for the proceedings.

And last but not least, we thank all the members of the agricultural education profession for their support of our efforts in planning and conducting this conference. This group is one of the finest groups of professionals in the nation and it has been a pleasure providing this service for "our family."

Analysis of the Relationships Between Computer Experiences, Self-Efficacy, and Knowledge of Undergraduate Students Entering a Land-Grant College of Agriculture

Donald M. Johnson
Melissa L. Lester
James A. Ferguson
University of Arkansas

Abstract

Students entering a college of agriculture and enrolled in a college-wide freshmen orientation seminar in fall 1999 ($n = 84$) and fall 2000 ($n = 69$) were surveyed to determine their computer experiences, computer self-efficacy, and computer knowledge. The purpose of the study was to describe entering students on these variables, determine if significant differences existed between the students by year, and to determine the relationships between the variables. Comparisons by year of enrollment indicated that the students were not significantly ($p > .05$) different on any of the study variables. A majority of the students reported owning a computer and having completed one or more computer courses. A majority of the students had received formal instruction in word processing and file management, while less than 50% had studied spreadsheets, presentation graphics, Internet or e-mail use, databases or computer programming. A majority of students in both years felt they had average or above average skills in word processing, electronic mail, Internet use, and file management. Conversely, a majority of respondents felt they had below average skills in spreadsheets, presentation graphics, databases, and computer programming. The mean scores on the computer knowledge exam were low both years (39.7% correct in 1999 and 41.7% correct in 2000). The variables high school grade average, number of computer courses completed, number of computer topics studied, and computer knowledge exam score all had significant ($p \leq .05$) positive correlations with computer self-efficacy for both the 1999 and 2000 student groups. A multiple regression equation containing these four variables explained 49.1% of the variance in computer self-efficacy. Computer knowledge exam score accounted for approximately 15.6% of the unique variance in computer self-efficacy, while high school grade average accounted for approximately 9.8% of the unique variance. A second regression analysis, using only these two predictors, indicated that, in combination, they were able to explain 44.2% of the variance in computer self-efficacy. The number of computer courses completed, number of computer topics studied, and computer self-efficacy all had significant positive correlations with computer knowledge exam scores for both the 1999 and 2000 student groups. Multiple regression analyses indicated that a linear combination of these three variables did not improve prediction of computer knowledge exam scores over that which could be achieved using computer self-efficacy alone (adjusted $R^2 = .35$ vs. $r^2 = .35$). Recommendations for educational practice and additional research were made based on these findings.

Introduction and Theoretical Framework

Computers are an integral and pervasive feature of modern society. According to the United States Department of Education (USDE, 1996):

> Computers and information technologies are transforming nearly every aspect of American life. They are changing the way Americans work and play, increasing productivity, and creating entirely new ways of doing things. Every major U.S. industry has begun to rely on computers. (p. 9)

Computers play an important and ever increasing role in agriculture. Thus, university agriculture programs must ensure that their graduates are competent in computer use (Langlinas, 1994). A study conducted for the College of Agriculture and Life Sciences at Cornell University (Monk, Davis, Peasley, Hillman, & Yarbrough, 1996) concluded that agricultural employers "have a high expectation of computer literacy in recent college graduates" (p. 12). More than 80% of the employers rated computer skills as either an "important" or "very important" factor considered in making employment decisions. The employers rated skills in using word processing, spreadsheet, database, and presentation graphics programs as the most important computer abilities needed by prospective employees. Similar results were found in agricultural employer studies conducted for the University of Arkansas (Graham, 1997) and the University of Nebraska (Andelt, Barrett, & Bosshamer, 1997).

According to Kieffer (1995), many university faculty members and administrators accept the premise that students entering college are already competent in basic computer applications and tasks. Yet, recent research (Johnson, Ferguson, & Lester, 1998,1999) does not support this conclusion. In fact, research even suggests that students graduating from colleges of agriculture may not have adequate computer skills and knowledge (Heyboer & Suvedi, 1999; Johnson et al., 2000).

Efficacy theory suggests that task involvement and persistence are greater when individuals are confident (have a high level of self-efficacy) of their ability to successfully complete a task (Bandura, 1982). Thus, individuals having a high level of computer self-efficacy should be more likely to engage in computer tasks and to show persistence in completing computer tasks despite possible difficulties. Individuals with a low level of computer self-efficacy should be more likely to avoid computer tasks or to give up on a computer task in face of performance obstacles.

According to Kinzie, Delecourt, and Powers (1994), "Self-efficacy is predictive of future engagement with computer technologies, and . . . experiences with computers affect future use only through their effects on self-efficacy." Clearly, the need exists to explore the relationships between computer experiences, computer self-efficacy and measures of computer skills and knowledge. Such research would add to the theory base of research in computer education.

Purpose and Objectives

The purpose of this study was to determine the relationships between selected computer experiences, computer self-efficacy, and computer knowledge of students entering a land-grant college of agriculture during the fall semesters of 1999 and 2000. The specific objectives of the study were to:

1. Describe the computer experiences, computer self-efficacy, and computer knowledge of students enrolled in a college-wide orientation seminar (AGED 1011) over a two-year period and determine if significant differences existed between the students based on year of enrollment (1999 or 2000);

2. Determine the relationships between selected variables and computer self-efficacy and computer knowledge by year (1999 or 2000), and determine if significant, stable relationships existed between these variables;

3. Determine if a single or linear combination of variables could explain a significant proportion of the variance in computer self-efficacy and computer knowledge across years (1999 and 2000).

Methods

This study was conducted using a descriptive-correlational design. The subjects consisted of students enrolled in AGED 1011 (Agriculture Freshman Orientation) during the fall 1999 semester (five sections, $\underline{N} = 84$) and the fall 2000 semester (four sections, $\underline{N} = 73$). In 1999, all 84 students provided usable responses for a 100% response rate; in 2000, 69 students provided usable responses for a 94.5% response rate. The AGED 1011 course was selected because all students enrolled were either entering freshmen or new transfer students having completed fewer than 24 semester credit hours.

Data were collected by student responses to the "Computer Experiences and Knowledge Inventory" (CEKI). The CEKI, which was developed by the researchers and used in previous studies (Johnson, et al., 1998, 1999, 2000), consisted of three parts. Part One contained 21 items related to respondent demographics and previous computer experiences. Part Two was composed of eight Likert-type items requiring respondents to assess their self-perceived level of skill (1 = "no skill"; 5 = "high skill") in specific areas of computer use. Part Three consisted of 35 multiple choice items (with 5 response options, including a "Do not know" option) designed to measure computer knowledge in the areas of: general computer knowledge (six items), Internet use (five items), word processing (eight items), file management (five items), spreadsheets (six items), databases (three items), and BASIC computer programming (two items). All items in Part Three were written so as to be answerable by persons familiar with common operating systems and application programs. In other words, the items were not software specific.

The CEKI was evaluated by a panel of five experts with experience in teaching introductory computer applications courses to college agriculture students and was judged to possess face and content validity. The instrument was pilot-tested with six high school seniors participating in an on-campus agricultural internship program during summer 1998. The participants reported no difficulty in interpreting the instructions or items contained in the CEKI. Pilot-test reliability estimates were .90 (coefficient alpha) for Part 2 (computer self-efficacy), and .79 (KR-20) for Part Three (computer knowledge) of the instrument.

For this study, coefficient alpha reliability estimates of .89 (1999 group), .86 (2000 group), and .88 (combined) were obtained for Part 2 of the CEKI. The KR-20 reliability estimates for Part 3 were: .78 (1999 group), .72 (2000 group), and .76 (combined). The reliability of Part One of the CEKI was not assessed, since, according to Salant and Dillman (1994, p. 87), responses to non-sensitive, demographic items are subject to "very little measurement error."

The data were analyzed using descriptive, nonparametric, and inferential statistics. An a priori alpha level of .05 was established as the critical standard for all tests of statistical significance. The use of inferential statistics was based on the assumption that the students included in this study were a time and place sample representative of past, present and future undergraduate students entering this college of agriculture. According to Oliver and Hinkle (1982, p. 200), "Such an assumption permits the use of inferential statistics, and, if made, must be defended by the researcher as being reasonable." Based on the consistent findings of previous research (Johnson et al.,1998,1999, 2000) concerning the computer experiences, self-efficacy, and knowledge of students entering this college, the researchers felt such an assumption was warranted.

Results

There were no significant ($p \leq .05$) differences between years (1999 vs. 2000) for any of the student demographic characteristics included in this study. Females comprised a majority of students in both 1999 and 2000, 54.8% and 56.2%, respectively ($x^2 = .05$, $df = 1$, $p \leq .83$). Almost all students were classified as freshmen in both 1999 and 2000, 97.6% and 95.6%, respectively ($x^2 = .46$, $df = 1$, $p \leq .50$). Reported high school graduating class sizes were similar in both 1999 ($M = 195.2$) and 2000 ($M = 208.2$), $t\,(148) = 0.45$; $p \leq .65$. Self-reported high school grade averages for the two groups were similar, with a majority of students in both 1999 (61.9%) and 2000 (53.6%) reporting an "A-minus" or higher average ($x^2 = 1.20$, $df = 2$, $p \leq .55$). Finally, the average age of the students was similar in 1999 ($M = 18.4$) and 2000 ($M = 18.2$), $t\,(151) = -.48$; $p \leq .64$.

Objective one

Slightly over three-fourths of the students in both 1999 and 2000 reported having completed one or more computer courses, with word processing and file management being the topics most frequently studied in both years. Less than one-half of the students in either year reported receiving formal instruction in Internet or electronic mail use, presentation graphics, databases or computer programming. While slightly over 50% of the 1999 group had studied spreadsheet use, slightly less than 50% of the 2000 group had studied this topic. The percentage of students owning a computer, and the percentage completing a course where computer use was required were both somewhat higher in 2000 than in 1999. Chi square analyses indicated that there were no statistically significant differences between the two groups for any of these variables, and that all observed differences were within the range of sampling error (Table 1).

There were no statistically significant differences between the 1999 and 2000 student groups in the number of computer courses completed or the number of computer topics studied. The 1999 group had completed a mean of 1.64 ($S.D. = 1.28$) computer classes, while the 2000 group had completed 1.36 ($S.D. = 1.07$) courses, $t\,(151) = -1.45$; $p \leq .15$. Of the eight computer

Table 1. Computer Experiences of Students Enrolled in AGED 1011 in Fall 1999 and Fall 2000.

Computer-related experience	Year 1999 (n = 84) Yes (%)	1999 No (%)	Year 2000 (n = 69) Yes (%)	2000 No (%)	x^2	p
Completed computer course(s)	77.4	22.6	78.3	21.7	.02	.90
Studied the following computer topics:						
File management	59.5	40.5	63.8	36.2	.29	.59
Word processing	76.2	23.8	78.3	21.7	.09	.76
Internet/WWW	40.5	59.5	42.0	58.0	.04	.85
Electronic mail	31.0	69.0	39.1	60.9	1.11	.29
Spreadsheets	51.2	48.8	47.8	52.2	.17	.69
Presentation graphics	45.2	54.8	42.0	58.0	.16	.69
Databases	38.1	61.9	42.0	58.0	.24	.62
Computer programming	19.0	81.0	13.0	87.0	1.00	.32
Completed course(s) requiring computer use	47.6	52.4	56.5	43.5	1.20	.27
Own a computer	71.1	28.9	80.6	19.4	1.80	.18

topics listed, the 1999 group reported having studied a mean of 3.61 (S.D. = 2.67) topics, while the 2000 group had studied 3.68 (S.D. = 2.67) topics, t (151) = 0.17; $p \leq .86$.

The students rated their own level of skill in each of eight areas of computer use on a 5-point Likert-type scale (1 = "none," 2 = "below average," 3 = "average," 4 = "above average," and 5 = "high"). These five response categories were subsequently collapsed into three categories for analyses and reporting purposes (1 & 2 = 'below average," 3 = "average," and 4 & 5 = "above average"). As shown in Table 2, a majority of respondents in both 1999 and 2000 felt they possessed either "average" or "above average" skills in word processing, electronic mail, Internet use, and file management. Conversely, in both years, a majority of respondents felt they possessed "below average" skills in spreadsheets, presentation graphics, databases, and computer programming. Chi square analyses indicated there were no statistically significant differences between the 1999 and 2000 student groups for their self-perceived level of skill in any of the eight areas of computer use.

Responses to the eight individual items reported in Table 2 were summed and averaged (using the original 5-point scale) to arrive at a composite measure of computer self-efficacy (CSE) for each respondent (alpha = .89 and .86, respectively, for the 1999 and 2000 student groups). The mean CSE score for the 1999 group was 2.78 (S.D. = .78); for the 2000 group the mean CSE score was 2.75 (S.D. = .72). There was no statistically significant difference between the mean scores for the two years, t (150) = -0.26; $p \leq .80$.

Table 2. Self-perceived Level of Skill in Selected Areas of Computer Use, 1999 and 2000

	1999 (n = 84)			2000 (n = 69)				
Computer area	Below Average %	Average %	Above Average %	Below Average %	Average %	Above Average %	x^2	p
Word Processing	9.5	41.7	48.8	4.4	31.1	32.9	1.94	.38
Electronic mail	16.7	44.0	32.4	8.7	53.6	26.6	2.58	.27
Internet use	16.7	48.8	34.5	10.1	55.1	34.8	1.46	.48
File management	20.2	42.9	36.9	26.1	46.4	27.5	1.69	.43
Spreadsheets	52.4	32.1	15.5	60.8	26.1	13.0	1.11	.57
Presentation graphics	57.1	25.0	17.9	58.0	26.1	15.9	.10	.95
Databases	60.7	29.8	9.5	68.1	18.8	13.0	2.57	.28
Programming	82.1	11.9	6.0	82.6	11.6	5.8	0.01	.99

For the 1999 student group, the overall mean score on the 35 item exam portion of the CEKI was 13.89 (39.7% correct) with a standard deviation of 5.12 and a median of 13.0 (37.1% correct). The 2000 student group achieved a mean score of 14.61 (41.7% correct) with a standard deviation of 4.68 and a median of 15.0 (42.9% correct). There was no statistically significant difference between the mean scores based on year of enrollment, t (151) = 0.90; $p \leq .37$.

Objective two

Objective two sought to determine if there were statistically significant ($p \leq .05$) and stable correlations between selected predictor variables and the criterion variables of computer self-efficacy and computer knowledge. To accomplish this objective, appropriate bivariate correlations (and their associated probability levels) were calculated between each variable and computer self-efficacy and CEKI exam score, by year. Z-scores were then calculated to determine if the correlations between a predictor and the criterion variable were significantly ($p \leq .05$) different by year. A variable was considered to be a potentially useful predictor if it was significantly related (in the same direction) with the criterion variable both years, and if there was no significant difference between years for the correlation coefficient.

As shown in Table 3, high school grade average, number of computer courses completed, number of computer topics studied, and CEKI exam score all had significant positive correlations with computer self-efficacy for both the 1999 and 2000 groups. The magnitude of these correlations ranged from low to substantial, using the descriptors suggested by Davis (1971). The

Table 3. Relationship Between Selected Student Characteristics and Computer Self-efficacy, 1999 and 2000.

	Computer self-efficacy				
	1999		2000		
Characteristic	n	r	n	r	z
Gender[a]	84	-.12[b]	67	-.21[b]	.56
Age	81	-.12[c]	67	-.04[c]	.49
High school graduating class size	80	.05[c]	67	.16[c]	.69
High school grade average	81	.39[c]*	67	.49[c]*	.75
Completed computer use course[d]	81	.01[b]	67	.25[b]*	1.48
Number of computer courses completed	81	.28[c]*	67	.49[c]*	1.50
Table 3 (cont.)					
Number of computer topics studied	81	.35[c]*	67	.38[c]*	.21
Completed course requiring computer use[d]	81	.28[b]*	67	.22[b]	.39
Own a computer[d]	80	.42[b]*	67	-.10[b]	3.32*
CEKI Exam score	81	.63[c]*	67	.54[c]*	.83

[a]Coded as 0 = female, 1 = male. [b]Point-biserial correlation. [c]Pearson product correlation. [d]Coded as 0 = no, 1 = yes.
*$p \leq .05$.

relationship between owning a computer and computer self-efficacy was the only correlation that was significantly different between years.

As shown in Table 4, the number of computer courses completed, the number of computer topics studied, and computer self-efficacy had significant positive correlations with CEKI exam scores across both years. The magnitude of these correlations ranged from low to substantial. There were no statistically significant differences between the correlation coefficients by year.

Objective three

The final objective was to determine if a single or linear combination of variables could explain significant amounts of the variance in computer self-efficacy and CEKI exam scores across years. Only variables previously found to have significant, stable correlations with the criterion variables (objective two) were considered as potential predictors for this objective.

The variables of high school grade average, number of computer courses completed, number of computer topics studied, and CEKI exam score all had significant positive correlations with computer self-efficacy for both the 1999 and 2000 student groups (Table 3). When the two years were combined, each of the four potential predictor variables still had a significant positive

Table 4. Relationship Between Selected Student Characteristics and CEKI Exam Scores, 1999 and 2000.

	CEKI exam score				
	1999		2000		
Characteristic	n	r	n	r	z
Gender[a]	84	-.11[b]	69	.12[b]	1.41
Age	84	-.27[c]*	69	-.14[c]	.83
High school graduating class size	81	.07[c]	69	.17[c]	.61
High school grade average	81	.21[c]	69	.32[c]*	.73
Completed computer use course[d]	84	.15[b]	69	.16[b]	.06
Number of computer courses completed	84	.24[c]*	68	.40[c]*	1.09
Number of computer topics studied	84	.31[c]*	69	.36[c]*	.34
Completed course requiring computer use[d]	82	.08[b]	67	.11[b]	.21
Own a computer[d]	83	.20[b]	67	-.09[b]	1.46
Computer self-efficacy	81	.63[c]*	67	.54[c]*	.83

[a]*Coded as 0 = female, 1 = male.* [b]*Point-biserial correlation.* [c]*Pearson product correlation.* [d] *Coded as 0 = no, 1 = yes.*
*$p \leq .05$.

correlation with the criterion variable (computer self-efficacy). In addition there were significant intercorrelations between the predictor variables (Table 5).

Using multiple regression, computer self-efficacy was regressed on the linear combination of the four predictor variables. The multiple regression equation containing these four variables explained 49.1% of the variance in computer self-efficacy, F (4, 143) = 34.45, $p \leq .0001$, adjusted $R^2 = .48$.

Table 5. Correlation Matrix for Potential Predictor Variables and Computer Self-efficacy (n = 148).

	Intercorrelations				
Variable	1	2	3	4	5
1. High school grade average	1.0	.09	.02	.25*	.44*
2. Number of computer courses completed		1.0	.67*	.29*	.37*
3. Number of computer topics studied			1.0	.33*	.36*
4. CEKI exam score				1.0	.59*
5. Computer self-efficacy					1.0

*$p \leq .05$.

Beta weights (standardized multiple regression coefficients) and uniqueness indices (squared semi-partial correlations) were then reviewed to assess the relative importance of the four variables in predicting computer self-efficacy. These beta weights and uniqueness indices are presented in Table 6.

Table 6. Beta weights and Uniqueness Indices Obtained in Multiple Regression Analysis Predicting Computer Self-efficacy.

	Beta Weights[a]		Uniqueness Indices[b]	
Predictor	Beta	t[c]	Uniqueness Index	F[d]
High school grade average	.32	4.41*	.098	9.24*
Number of computer courses completed	.12	1.53	.009	0.85
Number of computer topics studied	.13	1.60	.008	0.75
CEKI exam score	.43	6.61*	.156	14.7*

[a]Standardized multiple regression coefficients. [b]Squared semi-partial correlations indicating the percentage of unique variance in computer self-efficacy explained by a given predictor. [c]For t tests of the significance of the beta weights df = 143. [d]For F tests of the significance of the uniqueness indices df = 1, 143.
*$p \leq .05$.

The data in Table 6 show that only high school grade average and CEKI exam scores had statistically significant beta weights. CEKI exam score had a somewhat larger beta weight than did high school grade average. The results from the uniqueness indices match those for the beta weights, in that only high school grade average and CEKI exam score were statistically significant. CEKI exam score accounted for approximately 15.6% of the unique variance in computer self-efficacy, beyond that accounted for by the other three predictors. High school grade average accounted for approximately 9.8% of the unique variance in computer self-efficacy. A second regression analysis, using only these two predictors, indicated that, in combination, they were able to explain 44.2% of the variance in computer self-efficacy, $F\ (2, 145) = 57.43$, $p \leq .0001$, adjusted $R^2 = .43$

The variables number of computer courses completed, number of computer topics studied, and computer self-efficacy all had significant positive correlations with computer self-efficacy for both the 1999 and 2000 student groups (Table 4). When the two years were combined, each of the four potential predictor variables still had a significant positive correlation with the criterion variable (computer self-efficacy). In addition there were significant intercorrelations between the predictor variables (Table 7).

Using multiple regression, CEKI exam score was regressed on the linear combination of the three predictor variables. The multiple regression equation containing these three variables explained 35.9% of the variance in CEKI ecam scores, $F\ (3, 144) = 26.90$, $p \leq .0001$, adjusted $R^2 = .35$.

Table 7. Correlation Matrix for Potential Predictor Variables and CEKI Exam Scores (n = 148).

	Intercorrelations			
Variable	1	2	3	4
1. Number of computer courses completed	1.0	.67*	.37*	.29*
2. Number of computer topics studied		1.0	.36*	.33*
3. Computer self-efficacy			1.0	.59*
4. CEKI exam score				1.0

*$p \le .05$.

Again, beta weights and uniqueness indices were reviewed to assess the relative importance of the three variables in predicting CEKI exam scores. As shown in Table 8, only computer self-efficacy had a statistically significant beta weight or uniqueness index. Computer self-efficacy accounted for approximately 24.7% of the unique variance in CEKI exam scores. Reviewing the bivariate correlation ($r = .59$) between computer self-efficacy and CEKI exam score (Table 7), indicates that computer self-efficacy, when used alone to predict CEKI exam scores, was capable of explaining 34.8% of the variance ($r^2 = .348$).

Table 8. Beta weights and Uniqueness Indices Obtained in Multiple Regression Analysis Predicting CEKI Exam Scores.

	Beta Weights[a]		Uniqueness Indices[b]	
Predictor	Beta	t^c	Uniqueness Index	F^d
Number of computer courses completed	.000	0.00	.000	0.00
Number of computer topics studied	.126	1.39	.008	1.77
Computer self-efficacy	.524	7.46*	.247	51.60*

[a]Standardized multiple regression coefficients. [b]Squared semi-partial correlations indicating the percentage of unique variance in CEKI exam scores explained by a given predictor. [c]For t tests of the significance of the beta weights $df = 144$. [d]For F tests of the significance of the uniqueness indices $df = 1, 144$.

*$p \le .05$.

Conclusions and Recommendations

This study sought to describe, compare, and explain the relationships between computer experiences, self-efficacy and knowledge for students entering a land-grant college of agriculture, and enrolled in a freshmen orientation seminar, in the fall of 1999 and 2000. Understandings developed from this study will provide guidance in the enhancement of the computer education provided to these and future agriculture students. In addition, the findings of this study will add to the theoretical base for future research.

The first major conclusion to be drawn from this study is that there were virtually no differences by year on any computer-related variable for students enrolled in AGED 1011, Agriculture Freshman Orientation. Despite well-publicized, rapid changes in computer technologies, these results indicate that students entering this College vary little in computer experiences, self-efficacy, or knowledge from one year to the next. Any changes that will doubtless occur will most likely be evolutionary, rather than revolutionary. Thus, the exponential growth in students' computer experiences and knowledge predicted by some futurists may be somewhat overstated. Colleges of agriculture should continue to base computer education requirements and expectations on reality rather than perceptions.

Across years the students in this study reported a variety of computer experiences. Approximately three-fourths had completed one or more computer courses and owned a computer. A majority of the students had received formal instruction in word processing and file management. However, a majority of students had not received formal instruction in Internet or electronic mail use, spreadsheets, presentation graphics, databases or computer programming. Only about one-half of the students reported ever completing a course (other than a computer applications course) where computer use was required. Thus, it was concluded that these students had not completed a common core of educational experiences related to the most commonly used computer applications and tasks. Professors teaching introductory courses should take this into account as they plan computer-related assignments.

Overall, the students perceived their level of competence in word processing, electronic mail, Internet use, and file management as average or above average. They perceived their skills in spreadsheets, presentation graphics, databases and computer programming as being below average. The overall mean for computer self-efficacy was slightly below the mid-point on the 1 to 5 scale. Based on these findings, it was concluded that many entering students lack confidence in their computer skills. This finding is especially troubling given the relationship between low computer self-efficacy and avoidance of computer tasks (Bandura, 1982; Fletcher & Deeds, 1994; Kinzie et al., 1994).

Students scored approximately 40% correct on the exam portion of the CEKI. Thus it was concluded that, overall, entering students have a fairly low level of computer knowledge. Taken together with the finding concerning computer self-efficacy, the researchers recommend that a college-wide computer applications course requirement should be established for all students entering the College. Students should be required to complete this course during their first year of enrollment. However, because some students do appear to have an acceptable level of computer knowledge, a performance testing option should be available to allow students to test out of this required course.

High school grade average, number of computer courses completed, number of computer topics studied, and CEKI exam score all had significant, positive and stable correlations with computer self-efficacy. CEKI exam score and high school grade average were the best predictors of computer self-efficacy, with a linear combination of these two variables explaining 44.2% of the variance in self-efficacy. This finding make sense theoretically given that previous academic success (as evidenced by higher grades) may condition one to expect general academic success, while greater knowledge about a specific domain (as evidenced by higher CEKI exam scores) may lead to higher confidence in one's ability within this domain (Good & Brophy, 2000). Further research should be conducted to test this hypothesis.

The number of computer courses completed, number of computer topics studied, and computer self-efficacy all had significant, positive and stable correlations with CEKI exam scores. However, a linear combination of these three variables did not improve prediction of CEKI scores over the use of computer self-efficacy alone. This supports the contention by Kinzie et al. (1994) that the effects of various computer experiences primarily act to enhance computer self-efficacy, which, in turn, is the best predictor of computer skills (or knowledge). Again, further research should be conducted to gain a better understanding of this efficacy effect on student computer learning.

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Learning Communities and Agricultural Youth Organizations: Their Influence on College Agriculture Students' Academic Performance and Retention

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Abstract

One of the most important challenges facing colleges of agriculture today involves recruiting, retaining, and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. This study compared the influence of participation in a learning community called a Freshman Interest Group (FIG) and participation in agricultural youth organizations (4-H/FFA) on academic performance and retention of freshmen in the College of Agriculture, Food and Natural Resources at the University of Missouri. Freshmen enrolled in a college-wide learning and development course in the Fall of 1997 and 1998 ($\underline{n}$ = 442) participated. Involvement in a FIG and participation in an agricultural youth organization (4-H and/or FFA) were investigated as variables that could possibly influence academic performance and retention. Analysis of Covariance (ANCOVA) procedures were utilized to determine the influence of participation in FIGs and agricultural youth organizations on academic performance. The Chi square test for association was utilized to determine the influence of participation in FIGs and agricultural youth organizations on retention.

Participation in a FIG was not found to be a significant variable in its influence on either academic performance or retention for the sophomore year. However, prior involvement in agricultural youth organizations was found to have a significant association with students' academic performance as well as retention in the college of agriculture. The study raises important implications for the recruitment of individuals with prior experience in agricultural youth organizations as potentially successful students in colleges of agriculture.

Introduction/Theoretical Framework

"Nothing is permanent but change." This quote by the Greek philosopher, Heraclitus, presents a holistic summary of agriculture over the past century. It also provides an accurate projection of what agriculture is likely to experience in the new millennium.

Change has been a defining characteristic of agriculture. In 1950, 17% of the population in the United States lived on a farm, whereas today, less than two percent of the population resides on a farm. Yet, agricultural production has increased by 150% over the past 45 years (National Research Council [NRC], 1995). Furthermore, farming is not the only segment of agriculture that has experienced change. The food, fiber, and natural resource sectors currently employ 18% of the U.S. population and contribute 16% of total "value added" endeavors in the processing, marketing, and distribution of agricultural products (NRC, 1995). Through research, development, and education, colleges of agriculture across the nation have contributed greatly to this growth in productivity (NRC, 1996). However, with change comes challenge; and colleges of agriculture must face the challenges of providing education for the human resource base in a rapidly growing, increasingly global, and highly technological food, fiber, and natural resource system (NRC, 1996).

Possibly, the most important challenges facing colleges of agriculture today involve recruiting, retaining, and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. Goeker, Coulter, and Stanton (1995) predicted that at the turn of the millennium a shortfall of almost four percent would exist between employment opportunities and available graduates in food and agricultural sciences and cooperating fields. The previous prediction supported Russell's assertions of an impending "brain drain" in agriculture, or more specifically, a lack of qualified individuals with an agricultural background or experience (Russell, 1993). In addition to changing industry demands, colleges face great monetary investments dependent upon the academic success and degree completion of their students. With rising costs of education and depleting sources of funding, loss of students in colleges of agriculture translates to significant losses of instructional dollars (Dyer, Lacey, & Osborne, 1996). To remain viable, colleges of agriculture must meet these challenges by discovering ways of predicting the academic success and ensure the academic retention of its students.

In studying the complex phenomenon of education, Cruikshank (1990) suggested using theoretical models such as those developed and tested by Dunkin and Biddle. The theoretical framework for this study was derived from an adaptation of Mitzel's Model of teaching, as presented by Dunkin and Biddle (1974). In their model, Dunkin and Biddle suggested that the study of teaching and learning involve four categories of variables: presage, context, process, and product (Figure 1).

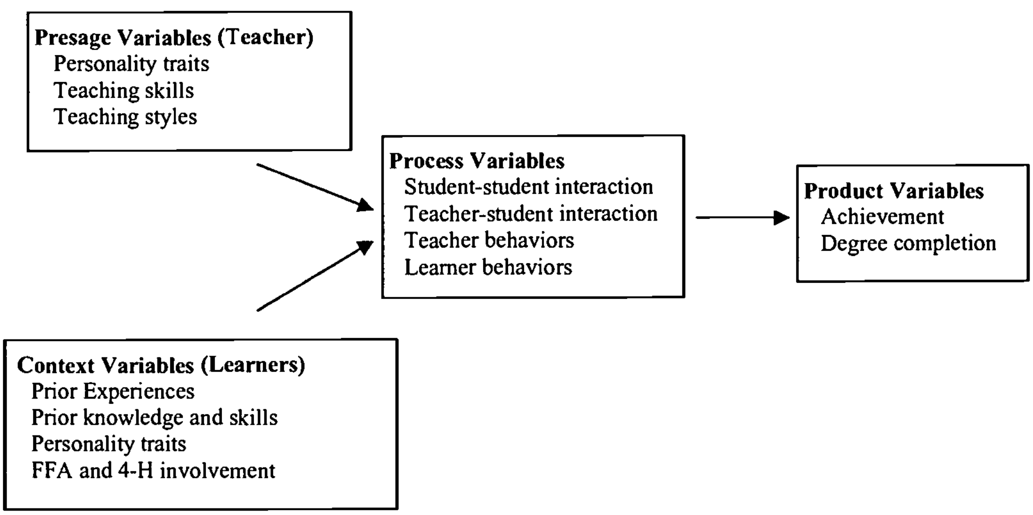

Figure 1. Theoretical Model for the Study of Classroom Teaching

Presage variables include those that influence teachers and their teaching behaviors (i.e., those things that teachers contribute to the learning process). Context variables are those that students contribute. Context variables include the background of learners, their prior knowledge and skills, their attitudes toward learning, and their involvement in organizations and activities that may potentially shape the nature of their personality and skill development, such as 4-H and/or FFA. Process variables describe the interaction of teacher and learner behaviors in the teaching-learning process. Examples include institutional activities and programs that support teacher-student or student-student interactions, such as learning communities. Finally, product variables include the knowledge and skills gained or attitudes modified as a result of teaching and learning.

Involvement in agricultural youth organizations such as FFA and 4-H are important context variables that have been shown to influence educational outcomes such as student achievement, skill attainment, and even student retention in colleges (Dyer & Breja, 1999; Dyer, et al, 1996). At an ever-increasing rate, students who enter colleges of agriculture are deficient in agricultural experience (Dyer, et al, 1996; Scofield, 1995). Dyer, Lacey, and Osborne noted that colleges of agriculture could select students with the next best thing: experience in high school agriculture classes, 4-H, and FFA. Participation in 4-H and FFA was shown to influence the outcomes of achievement and life skill development (Fleming-McCormick & Tushnet, 1997; Junge, 1994; Pruckno & Miller, 1987; Seevers & Dormody, 1994; Thomas & Ladewig, 1985). Another important influence on the products of teaching and learning is the educational setting or the academic institution in the teaching and learning process. Not all learning takes place in the classroom. Institutions of higher education nationwide have developed the concept of learning communities in response to the current needs for enhanced academic performance, as well as improved rates of student retention (Hill, 1990; University of Missouri, 1996). Lenning and Ebbers (1999) defined learning communities as small subgroups of learners organized by common purpose and mode of interaction.

Learning communities are organized in a variety of approaches, such as freshmen interest groups, learning clusters, federated learning communities, and coördinated studies communities (Lenning & Ebbers, 1999; Tinto & Goodsell, 1994). Organized as clusters of students with common characteristics, similar academic interests, enrolled in similar courses, and living together in a residence hall, Freshman Interest Groups (FIGs) in particular have been noted to increase students' levels of academic performance and retention in postsecondary institutions (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996). Pike, Schreoder, and Barry (1997) concluded that student involvement in residential learning communities improved educational outcomes by fostering increased levels of student-student and faculty-student interactions, as well as enhanced student involvement in coursework. While a strong literature base supports FIGs as enhancing the outcomes of teaching and learning, research involving FIG participation among college of agriculture students is lacking. Specifically, can involvement in FIGs be utilized as a process variable to predict the product variables of student achievement and student retention in colleges of agriculture?

The current literature base is helpful in identifying context variables that can serve as predictors of student retention or life skill attainment. However, little research exists regarding the effectiveness of those context and process variables, specific to agriculture students, in predicting students' academic performance, specifically at the college level. Can selected context variables (4-H or FFA involvement) be a distinguishing characteristic on the academic performance and retention of students in colleges of agriculture?

By targeting specific variables that have the potential to enhance academic performance and student retention, colleges of agriculture have an opportunity to shape the changing face of agriculture, just as they have shaped scientific advancements and management practices in the past. While the population in the U.S. is on the rise, the population of individuals possessing experience with or a background in agricultural endeavors is in rapid decline (NRC, 1995). Colleges of agriculture across the nation must find ways to respond to the challenges of a population and a workforce in the midst of an agricultural "brain drain." Consequently, a research base is needed to identify characteristics that can be used in predicting the academic performance and retention of students in colleges of agriculture.

Purpose and Objectives

The purpose of this study was to compare the influence of participation in Freshmen Interest Groups (FIGs) and involvement in agricultural youth organizations (4-H/FFA) on academic performance and retention of freshmen in the College of Agriculture, Food and Natural Resources (CAFNR) at the University of Missouri. The following research questions were used to guide the study:

1. Did college of agriculture students who participated in a Freshmen Interest Group (FIG) have greater academic success than those students who did not participate in a FIG?

2. Did college of agriculture students who participated in agriculture youth organizations (FFA and/or 4-H) have greater academic success than students who did not participate in agricultural youth organizations?

3. Did college of agriculture students who participated in a Freshmen Interest Group (FIG) have a greater chance of returning for their sophomore year than students who did not participate in a FIG?

4. Did college of agriculture students who participated in agriculture youth organizations (FFA and/or 4-H) have a greater chance of returning for their sophomore year than students who did not participate in agriculture youth organizations?

For the purpose of statistical analysis, the research questions were posed as null hypotheses.

HO_1: There was no difference in the academic performance of students who participated in a FIG and those who did not participate in a FIG, when controlling for the variance associated with ACT score.

HO_2: There was no difference in the academic performance of students who had prior involvement in agricultural youth organizations and those who did not have prior involvement in agricultural youth organizations, when controlling for the variance associated with ACT score.

HO_3: There was no difference in the retention of students who participated in a FIG and those who did not participate in a FIG.

HO_4: There was no difference in the retention of students who had prior involvement in agricultural youth organizations and those who did not have prior involvement in agricultural youth organizations.

Procedures

The target population for this ex post facto study was freshman entering the College of Agriculture, Food and Natural Resources at the University of Missouri in the Fall Semesters of 1997 and 1998 ($\underline{N}$ = 664). The accessible sample consisted of intact groups of freshmen enrolled in a college learning and development course during those semesters ($\underline{n}$ = 442).

Involvement in a Freshman Interest Group (FIG) consisted of approximately 20 students living in the same residence hall. Participation requirements included concurrent enrollment in at least three courses and a weekly Proseminar led by a junior or senior student serving as a Peer Advisor. Participation in agricultural youth organizations was determined by students' prior enrollment in either FFA and/or 4-H at the high school level.

Analysis of Data

Students' academic performance was measured by their cumulative grade point at the completion of the freshmen academic year. Retention was based on enrollment status at the beginning of the first semester of the sophomore year. Descriptive statistics were generated for composite ACT score as well as cumulative GPA at the completion of the freshmen year. Values for cumulative GPA, composite ACT, and enrollment status were collected from a university database. Research hypotheses one and two were analyzed using analysis of covariance (ANCOVA). An ANCOVA procedure was used because there were between group differences of ACT scores. Research hypotheses three and four were tested using the Chi Square test for association. An alpha level of .05 was established a priori for all statistical tests.

Results

The mean cumulative GPA for students who participated in a FIG was 2.9, whereas the mean cumulative GPA for students who did not participate in a FIG was 2.7 (Table 1). Furthermore, the mean composite ACT score for students who participated in a FIG was 25.7, whereas the mean ACT score for students who did not participate in a FIG was 23.8.

The first null hypothesis was developed to ascertain if there was a difference in the academic success of students who participated or did not participate in a Freshmen Interest Group (FIG). The results of the analysis of covariance (ANCOVA) procedure are reported in Table 2. The main effect, participation in a FIG, did not produce a significant difference in students' academic performance when controlling for the influence on academic performance associated with ACT score. Therefore, the first null hypothesis asserting that there were no differences in academic performance between students who participated in a FIG and students who did not participate in a FIG was not rejected.

Table 1. Descriptive Data for Academic Performance and ACT Score for Freshmen Interest Group (FIG) Participation

	Participated (n=123)			Did Not Particpate (n=306)		
	M	SD	Range	M	SD	Range
Cumulative GPA	2.9	.8	.6-4.1	2.7	.7	.3-4.0
ACT score (covariate)	25.7	3.6	18-33	23.8	4.0	15-34

Table 2. Analysis of Covariance of FIG Participation by ACT Score

Source	df	MS	F	p
Intercept	1	7.50	17.92	.00
Covariate (ACT score)	1	40.52	96.84	.00
Main effect (FIG participation)	1	5.87	.01	.97
Error	422	.42		

The mean cumulative GPA of students who had been involved in an agricultural youth organization was 3.1, whereas the mean cumulative GPA of students who had not been involved in an agriculture youth organization was 2.6 (Table 3). The mean composite ACT score for students who participated in agricultural youth organizations was 25.4, whereas the mean composite ACT score for students who did not participate in an agriculture youth organization was 23.7.

The second null hypothesis was developed to ascertain if there was a difference in the academic success of students who had or did not have prior involvement in agricultural youth organizations. The results of the ANCOVA procedure are reported in Table 4. The main effect, involvement in agricultural youth organizations (FFA and/or 4-H), produced a significant difference in students' academic performance when controlling for the variance associated with ACT score. Therefore, the second null hypothesis asserting that there was no difference between the performance of students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 3. Descriptive Data for Academic Performance and ACT Score by Involvement in Agricultural Youth Organizations

	Involved (n=158)			Not involved (n=271)		
	M	SD	Range	M	SD	Range
Cumulative GPA	3.1	.6	.9-4.1	2.6	.7	.3-4.1
ACT score (covariate)	25.4	3.8	17.0-34.0	23.7	4.0	15.0-33.0

Table 4. Analysis of Covariance of Involvement in Agricultural Youth Organizations by ACT Score

Source	df	MS	F	p
Intercept	1	12.28	30.92	.00
Covariate (ACT score)	1	33.06	83.25	.00
Main effect (Ag Youth participation)	1	9.02	22.71	.00
Error	422	.40		

The third null hypothesis sought to determine if a difference existed in the retention of students who participated in a FIG versus those who did not participate. Results of the Chi Square test of association are presented in Table 5. Of the 317 freshmen who did not participate in a FIG, 43 did not enroll for their sophomore year. Regarding the 125 freshmen who participated in a FIG, 12 did not enroll for their sophomore year. Pearson's Chi Square yielded a value of 1.29, which was not significant (p=.255). Thus, the third null hypothesis asserting that there were no differences in retention between students who participated in a FIG and students who did not participate in a FIG was not rejected.

The fourth null hypothesis sought to determine if a difference existed in the retention of students who did or did not have prior involvement in agricultural youth organizations. Results of the Chi Square test of association are presented in Table 6. Of the 284 students who did not have prior involvement in an agricultural youth organization, 46 did not return fall of their sophomore year. Of the 158 freshmen that had been involved in an agricultural youth organization, nine did not enroll for their sophomore year. Pearson's Chi Square yielded a value of 10.73, which was significant (p = .001). Thus, the fourth null hypothesis asserting that their were no differences in retention between students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 5. Contingency Table by Retention and FIG Participation

	Retained for Sophomore Academic Year		
	No	Yes	Total
Did Not Participate in a FIG	43 (13.6%)	274 (86.4%)	317
Participated in a FIG	12 (12.4%)	113 (90.4%)	125
Total	55 (12.4%)	387 (87.6%)	442

χ^2 (1, N=442) = 1.29, $p > .05$

Conclusions and/or Recommendations

Students who participated in Freshmen Interest Groups (FIGs), while not markedly different in performance measures associated with cumulative GPA, did possess slightly higher ACT scores than those who did not participate in a FIG. When utilizing ACT scores as a covariate to equate the two groups on performance measures, participation in a FIG was not found to be a significant process variable in its influence on academic performance. Additionally, participation in a FIG was not found to possess a significant association with retention for the sophomore year. This finding contradicts prior studies (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996) indicating the positive influences of FIG participation on a student's academic performance and retention at the postsecondary level. While research has pointed toward FIGs as an effective solution for increasing students' retention and academic performance across universities as a whole, college of agriculture students may not experience the effects of FIG participation as immediately as do students in other colleges. Further quantitative as well as qualitative research is needed to determine the direct effects of FIG participation specific to college of agriculture students.

Table 6. Contingency Table by Retention and Agriculture Youth Organization Participation

	Students Retained for Sophomore Enrollment		
	No	Yes	Total
Not Involved in Ag Youth Organizations	46 (16.2%)	238 (83.8%)	284
Involved in Ag Youth Organizations	9 (5.7%)	149 (94.3%)	158
Total	55 (12.4%)	387 (87.6%)	442

χ^2 (1, N=442) = 10.28, $p < .05$

Students who were involved in agricultural youth organizations possessed important differences in performance measures associated with cumulative GPA. This finding is consistent with Dyer et al. (1996). The practical implications of this difference form striking distinctions between those who are selected and those who are excluded from college admission and/or scholarships based upon cumulative GPA. In addition, students who were involved in agricultural youth organizations scored approximately two points higher on the ACT. Yet, when utilizing ACT score as a covariate to equate the groups on performance measures, involvement in agricultural youth organizations was still found to have a significant influence on cumulative GPA.

Additionally, involvement in agricultural youth organizations was found to have a significant association with retention for the sophomore year. This finding was consistent with previous research indicating the influence of involvement in FFA and 4-H as an important indicator for retention in a college of agriculture (Dyer et al., 1996; Dyer & Breja, 1999). Thus, prior experiences such as involvement in agricultural youth organizations, can serve as significant context variables in their influence on the product variable of academic performance and retention in a college of agriculture. The implications of this finding are twofold. First colleges of agriculture, in order to ensure the success of their students, should continue efforts to recruit individuals with prior experiences in agricultural youth organizations. Finally, colleges of agriculture should continue to train quality individuals in the fields of agricultural and extension education in order to maintain a quality pool of FFA chapters and 4-H clubs from where future college of agriculture students may be selected. Continued quantitative and qualitative studies are warranted in order to further indicate presage, context, and process variables that can enhance the products of student achievement and retention in colleges of agriculture.

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Utilizing Professional Development To Ensure International Assignment Impact

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Abstract

A study was conducted to determine the specific components of international involvement that lead to personal and professional impact among Extension professionals and near-associates. The project focused on the participants of the Polish-American Extension Project (PAEP). Data were derived from a 19-page questionnaire that focused upon participants' work and living environment; perceptions about the international experience; respondent and home Extension unit characteristics while in Poland; characteristics of the US Extension unit and community while in Poland; nature of the assignment in Poland; the US international Extension climate; reentry and adjustment; output and visibility; and key linkages. Over 95% of the participants completed the questionnaire.

Like variables resulting from the data analysis were grouped and summated to create variable blocks for analysis. Items that were not indexed were used as individual variables. Indexed and individual variables derived from the study were correlated with three dependent variables: impact upon project participants, impact upon immediate and extended family members, and impact upon colleagues and clientele of PAEP participants.

This study has revealed the importance of international involvement for enhancing global impact among Extension professionals, colleagues, clientele and family members. Those who have an opportunity to live and work in another country not only contribute to the development of that country, but they also contribute numerous mutual benefits within America. Lessons and practices were learned from this study that can lead to enhanced international impact across participants and near-associates based upon endeavors that are properly designed and implemented. There are three important professional development / training junctures for international assignments: before one goes (pre-training), while one is there (reinforcement), and after one returns (de-briefing).

Introduction and Theoretical Framework

Cooperative Extension professionals have been utilized in many different ways to fulfill international education efforts. Because of the close working relationship with local clientele, Extension agents may often be involved in international exchanges or hosting foreign visitors. A number of international projects have included county Extension staff as well as state staff. These efforts have served to increase international awareness, understanding and involvement among Extension professionals (Place et al., 2000; Ludwig, 1999; Williams and Brewer, 2000).

Extension professionals are supportive of international involvement. A survey among Extension agents in the southern U.S. by Rosson and Sanders (1991) found that 86% of those surveyed felt that Extension programs should include more global issues; and 77% felt that constituents could benefit from programs with an international focus. Data collected concerning Extension's organizational support of programs with an international focus indicated that 37 percent agreed, 25 percent disagreed, and 38 percent were unsure of Extension's support. Other research has documented similar results (Andrews and Lambur, 1986; Knight, 2000; Ludwig, 1993; Ludwig, 1999). These results demonstrate the commitment and interest that Extension agents have for an interactive component of international endeavors.

An integral part of Extension's international involvement that has recently received attention is the personal and professional impact that is attained through such efforts. Studies are documenting the positive effects that Extension faculty and agents derive from their actual participation in an international endeavor. These professionals have experienced increased international awareness and understanding, incorporation of international components into Extension programming, improved self-esteem, and many have profited from a renewed interest in their Extension career. In addition, people outside of an actual international project have experienced various levels of benefit (Place et al., 2000; Williams and Brewer, 2000).

The Polish-American Extension Project (PAEP) was an agricultural technical assistance program designed to help address the needs of Poland in relation to agricultural production, management, Extension methodologies, and free-market economics. The PAEP was initiated in 1989 and ended in 1996 with a primary objective of improving the structure of Polish agriculture with the goal of increasing agricultural production efficiency and improving rural quality of life.

The project was established as a joint educational project of the United States Department of Agriculture's Extension Service (USDA-ES) and the Polish Ministry of Agriculture and Food Economy's (MAFE) Agricultural Advisory Service. Between 1990 and 1995, more that 100 American Extension professionals representing 31 land grant universities traveled to Poland to work on this project. Over the period of the project, 70 Extension professionals representing 26 states served one or more six-month assignments as advisors at provincial-level agricultural advisory centers (Osrodek Doradztwa Rolniczegos - ODRs) in Poland (Place et al., 2000). This group of 70 PAEP participants was the population for this study.

Purpose and Objectives

The purpose of this study was to determine the specific components of international involvement that lead to personal and professional impact among Extension professionals and near-associates. There were three objectives of the study: A. to determine factors related to personal and professional impact among project participants; B. to determine impact-related factors among immediate and extended family members, and; C. to determine impact-related factors among Extension colleagues and clientele. The factors derived from these objectives provide the basis for the identified professional development / training needs.

Methods and Procedures

A comprehensive questionnaire was developed to focus on the stated study objectives, and an expert panel of faculty from Penn State University and Michigan State University then reviewed it for content and face validity. Prior to pilot testing, adjustments were made to the questionnaire based upon the suggestions and recommendations. The instrument was pilot tested among a group of individuals from Penn State University who had knowledge of international technical assistance programs. Input received from the pilot test group was also incorporated into the instrument.

Survey methodologies as recommended by Dillman et al. (1995) were utilized for the study. Introductory letters were sent from the Program Specialist of USDA International Extension Programs to state level Extension administrators for the 26 states that had participants in the PAEP program. The questionnaire was sent to the 70 PAEP participants with an informing and encouraging cover letter that provided an overview of the study, what the questionnaire entailed and confidentiality. Completed questionnaires were requested to be returned in an enclosed self-addressed and postage-paid envelope (Dillman et al., 1995).

The 19-page questionnaire consisted of the following major sections: work and living environment; perceptions about the international experience; respondent and home Extension unit characteristics while in Poland; characteristics of the U.S. Extension unit and community while in Poland; nature of the assignment in Poland; the U.S. international Extension climate; reentry and adjustment; output and visibility; and key linkages.

After two waves of personal phone calls and remailings of the instrument, there were 67 returns for an overall response rate of 95.7%. Subsequent data analysis showed no difference between early and late respondents. This is an extremely high response rate for such a comprehensive questionnaire (Dillman et al., 1995). The high response rate supported the researchers assumption that participants were deeply committed and sincerely involved.

Data were coded and entered into a preset SPSS quantitative analysis program. Basic statistical analysis tests were initially conducted for observation of means, modes, frequencies and standard deviations. Qualitative data from the questionnaire were entered into a word document and categorized for subsequent content and critical incident analysis. The qualitative data were used to clarify and/or substantiate findings revealed via the participant questionnaire.

Like variables were grouped and summated to create variable blocks for analysis. Cronbach's alpha reliability was conducted on each variable block, and standardized alpha coefficients ranged from .61 to .92. Items that were not indexed were used as individual variables. These blocks of variables and individual variables were correlated with three dependent variables: the extent of personal and professional impact on PAEP participants, extent of impact on immediate and extended family members of PAEP participants, and extent of impact on colleagues and clientele of PAEP participants.

Results and Findings

The three dependent variables utilized in this study are reported as perceived by PAEP participants. Participants (N=67) perceived that they received the greatest benefit (8.5) from the PAEP, followed by their family members (6.8) and colleagues/clientele (5.2). Each dependent variable was derived from an 11-point scale that ranged from 0 = no impact to 10 = extensive impact. The overall means and standard deviations for these three dependent variables are reported in Table 1.

Table 1. *Means and Standard Deviations of the Dependent Variables**

Variable	Mean	Std. Dev.
Personal and professional impact on PAEP participants	8.53	1.38
Impact on immediate and extended family members of PAEP participants	6.79	2.78
Impact on colleagues and clientele of PAEP participants	5.20	2.93

Note. Each dependent variable was derived from an 11-point scale that ranged from 0 = no impact to 10 = extensive impact.

The majority of the PAEP participants were male (75%) whereas 25% were female. Most participants were married (73%), and the remaining 27% were either separated / divorced / widowed or single. Participants were well educated as 43% held or were in the process of obtaining doctorate degrees, 54% held or were attaining master's degrees, and only 3% held a bachelor's degree. There was wide variation of age among participants as most were in the 50 to 59 years of age category. Likewise, there was also a wide range of years of employment with Extension (1 to 40 years). The mean years of Extension employment was 19 years (Table 2).

Forty independent variables/variable blocks were considered in the bivariate analysis. These variables are a comprehensive set of factors that were correlated to the three dependent factors in an exploratory analysis. The independent variables are presented in the first column of Table 3. The mean and standard deviations are also presented, along with Cronbach's alpha for the indexes. Independent variables that were significantly correlated with the dependent variables were selected for inclusion in a multivariate regression analysis.

Table 2. *Demographic and Educational Characteristics of Polish-American Extension Project Participants*

Characteristic	Frequency	Percent
Gender		
Male	50	74.6
Female	17	25.4
	67	100.0
Marital Status		
Married	48	72.7
Separated/Divorced/Widowed	10	15.2
Single	8	12.1
	66	100.0
Highest Educational Level		
Bachelors	2	3.0
Masters in progress or completed	36	53.7
Doctorate in progress or completed	29	43.3
	67	100.0
Age of Participant		
30-39	10	14.9
40-49	16	23.9
50-59	25	37.3
60-69	15	22.4
Over 69	1	1.5
	67	100.0
Years of Employment with Extension		
Mean = 19.22 SD = 9.35 Min. = 1 Max. = 40 Mode = 12		

Table 3. The Bivariate Correlations for the Three Impact Variables and the Independent Variables

Independent Variables	Correlations: Overall Impact	Correlations: Impact on Family	Correlations: Impact on Colleagues and clientele	Mean	Std. Dev.	Range	Alpha
Level of Polish Support	NS	NS	NS	13.21	1.96	6-15	.712
Level of U.S. Support	NS	NS	.357***	15.25	3.76	5-20	.738
Prior Experience Index	NS	NS	NS	14.95	4.90	7-28	.817
Foreign Language Skills	NS	NS	NS	1.93	.92	1-4	-
Prior Interest in Foreign Language	NS	NS	NS	2.43	.94	1-4	-
Developed New Knowledge & Skills	NS	NS	NS	8.40	1.86	4-12	.651
Changed Attitudes About People	NS	NS	NS	9.82	1.77	3-12	.693
New Perspective on U.S. Extension	NS	NS	NS	3.53	.55	1-4	-
Changed Perspective on Self	.439***	NS	NS	2.83	.83	1-4	-
Career Opportunities in Extension	NS	.271*	.374***	3.21	1.67	1-4	-
Position & Relationships in Extension	.339***	.344***	.390***	3.63	1.45	1-5	-
Impact on Personal Relationships	.340***	.361***	.460***	11.03	7.53	3-15	.731
Impact on Your Health	NS	NS	.434***	2.56	1.68	1-5	-
Your Economic Well-Being	NS	NS	.291**	3.34	1.56	1-5	-
Satisfaction With Assignment	NS	NS	NS	9.28	1.01	4-10	-
County or State Position	NS	NS	.256*	.57	.49	0-1	-
Nature of Assignment	NS	NS	.280*	15.98	3.48	7-20	.762
Openness to Change of Host	NS	NS	NS	9.38	1.65	3-12	.729
Contribution Made to Host	NS	NS	NS	16.96	2.67	10-25	-
Family Members Accompanied	NS	.477***	NS	1.63	.49	1-2	-
Evaluation of Orientation	NS	NS	NS	11.03	2.61	3-15	.754
Level of Support from U.S.	NS	NS	NS	9.24	1.78	4-12	.607
Replacement for U.S. Position	NS	NS	NS	2.90	.81	1-4	-

(table continues)

Independent Variables	Correlations: Overall Impact	Impact on Family	Impact on Colleagues and clientele	Mean	Std. Dev.	Range	Alpha
Support for Assignment	NS	NS	NS	9.28	1.86	4-12	.640
Positive Factors in Participation	NS	NS	.259*	22.04	5.04	10-30	.872
Negative Factors in Participation	NS	NS	NS	8.50	2.70	3-15	.637
Extent of Work Communication	NS	NS	.458***	21.55	5.31	8-33	.776
Organizational Support	NS	.257*	.369***	13.01	2.53	7-16	.759
Prior Experience of Extension Unit	NS	NS	NS	19.24	7.25	10-40	.918
Visibility of Your Assignment	.373***	.373***	.553***	27.19	8.34	10-45	.887
Awareness of Your Assignment	.304 **	NS	.542***	21.36	5.40	8-30	.863
Office Ability to Accommodate	NS	NS	NS	2.15	.75	1-4	-
Family's Ability to Accommodate	NS	NS	NS	2.09	.80	1-4	-
Ease of Adjustment	NS	NS	NS	1.86	.74	1-4	-
Ease of Reentry	NS	NS	NS	2.00	.82	1-4	-
Gender of Participant	NS	-.282**	NS	1.22	.42	1-2	-
Marital Status	NS	.451***	NS	.61	.69	0-1	-
Age	NS	.249*	NS	3.71	1.02	1-5	-
Highest Educational Level	-.261*	NS	NS	3.70	1.05	1-5	-
Years of Employment in Extension	NS	.258*	NS	19.21	9.35	2-37	-

Note. N=67; NS = Not Significant. Alpha refers to Standardized Cronbach's Alpha Coefficients, which are only denoted for variable blocks.
*p< .05, **p<.01, ***p<.001;

<u>Multivariate Analysis</u>

The multivariate analysis was conducted through multiple linear regression. Regression is a technique that establishes the relationship of a variable while simultaneously controlling for the effects of the other variables in the model. A reduced or parsimonious model is presented for each of the dependent variables. All of the variables that had a statistically significant correlation with the dependent variable were placed simultaneously into a regression model. Variables that were not statistically significant in the regression model were removed, leaving only the significant variables, which are presented, in the following tables. Each table presents the regression coefficients (*b*), the standard error of the coefficient (SE of *b*), and the standardized beta (Standardized B). The standardized beta allows comparisons of relative strength of each variable within the model.

Overall Impact

Table 4 presents the reduced regression model for Overall Impact. All variables in the model are statistically significant at the .05 level or better. The overall Adjusted R^2 for the model is .31, meaning that 31% of the variation within the model is explained. The most important variable in the model, as seen in the standardized beta, is Changed Perspective on Self. This relationship indicates that the greater positive change in self-perception as a result of the PAEP was significantly related to the overall positive impact on the personal and professional life of the participants. This suggests that among the ways participants are impacted by the exchange experience, self-perception is very important. This also suggests that international experience fundamentally and positively changes the participants.

Table 4. Regression Analysis of Overall Impact and the significant independent variables

Variable	*B*	SE of *b*	Standardized B
Visibility of Your Assignment	.042*	.019	.263
Highest Education Level	-.275*	.130	-.213
Changed Perspective on Self	.565*	.185	.343
Constant	6.755*	.837	
Adjusted R^2	.31		

*$\underline{p}$< .05, N=67

The second most important variable was Visibility of Your Assignment. Respondents that worked at making their assignment visible reported a more positive overall impact. Visibility of Assignment assesses whether the participants communicated with clientele and colleagues through calls, press releases, or newsletters before, during, or after the Polish assignment. This indicates that it is important for program participants to relate their international experiences to their acquaintances. Respondents with master's degrees tended to report a more positive overall impact than those with doctorates. Perhaps this is due to the fact that those with master's degrees have fewer opportunities for international assignments, or they may have perceived a better fit with the greater applicable nature of the international assignment, thereby valuing it more.

Impact on Immediate and Extended Family

Table 5 presents the reduced regression model of Impact on Immediate and Extended Family. Four variables are statistically significant in this model and they account for 38 percent of explained variation in the model. The best predictor in this model was Family Members Accompanied on assignment. Those participants who traveled with their families were more likely to have a positive impact on family life than those participants that did not. Position and Relationships in Extension was the second most important variable in the analysis. The personal relationships that are formed in an international experience are an important contributing factor to a positive family impact.

Age was the third most important variable. Respondents that were older tended to report a more positive family impact. Older participants may have had greater experiences to draw upon for the assignment. Furthermore, older participants are likely to have grown children who are out of the household or are capable of taking care of themselves during the international experience thereby making it easier to commit to an international assignment. When participants are younger, family participation can help counter any negative impacts on family during the assignment. Last, Visibility of Your Assignment tended to positively impact family. It may be that higher visibility in participation has the effect of justifying or rationalizing any short-term hardships among the home Extension unit related to the assignment.

Table 5. *Regression Analysis of Impact on Immediate and Extended Family and the Significant Independent Variables*

Variable	*B*	SE of *b*	Standardized B
Family Members Accompanied	1.960*	.603	.351
Visibility of Your Assignment	.071*	.031	.215
Position & Relationships in Extension	.458*	.221	.245
Age	.596*	.228	.228
Constant	-2.101*	1.010	
Adjusted R^2	.38		

*$p < .05$, N=67

Impact on Colleagues and Clientele

The last dependent variable and reduced regression model, Impact on Colleagues and Clientele, is presented in Table 6. The model had an adjusted R^2 of .46, and there are three significant variables. Awareness of Assignment was the best predictor. When participants perceived that colleagues and friends were aware of their assignment, they tended to indicate a more positive impact on colleagues and clientele. Visibility of Your Assignment was the second most important variable, and the nature of the relationship is similar to that of Awareness. Last, higher reporting of the Extent of Work Communication was associated with higher reported positive impacts for colleagues and clientele.

Table 6. *The Regression Analysis of Impact on Colleagues and Clientele and the significant independent variables*

Variable	*B*	SE of *b*	Standardized B
Visibility of Your Assignment	.095*	.041	.275
Awareness of Your Assignment	.177*	.060	.328
Extent of Work Communication	.145*	.061	.261
Constant	-4.408*	1.438	
Adjusted R^2	.46		

*p< .05, N=67

Conclusions and Recommendations

The results of this study have demonstrated that Extension professionals perceive personal and professional growth for themselves and near-associates through international experience. Blocks of variables examined included: their work and living environment, perceptions about their international experience, the nature of the international assignment, the U.S. Extension climate, reentry and adjustment, output and visibility of the assignment, and demographic characteristics.

The international experience positively impacted self-perception. This experience seems to have lead to new perspectives of new people and places and self-actualization. Participation in the PAEP was done voluntarily as a selfless activity to help people in need after the fall of the communist bloc in Poland. Additionally, American participants enjoyed a high level of esteem from Polish colleagues and clientele. This further reinforced the positive self-perception. The cumulative effect of these factors was a positive overall impact from the PAEP.

Visibility of assignment was the only variable that was statistically significant across all three impact domains. This variable measured the extent to which the participant continued to communicate to others about the assignment. It is important for participants to understand that the experience continues even after they return from an international assignment. This may be due to the fact that the more people who are familiar with the international assignment, even after the fact, the more positive the impact on all domains. Visibility skills need to be an integral part of any type of training for international assignments.

It is important not to restrict international assignments to doctoral-level faculty. The data show that master's level participants benefit to a higher degree over those with more education. There are two possible explanations for this. International Extension work tends to be more applicable rather than theoretical and abstract which more closely parallels the domestic responsibilities of those with master's degrees. In addition, those with master's degrees tend to have fewer international opportunities, so perhaps they valued it more.

The family impact model indicated that participants whose family accompanied them perceived a greater impact among their immediate and extended family. This documents the importance for family involvement in these types of international endeavors. Also, older participants perceived a greater impact within this variable. This may be due to the fact that these participants had greater life experiences to share through the assignment. Furthermore, they may have greater familial flexibility as compared to younger counterparts.

Positive impacts on colleagues and clientele were enhanced through communication during the assignment. This included creating awareness and communicating with colleagues and clientele while in Poland. The nature of the relationship showed that if participants did not actively communicate during the assignment, it led to negative outcomes.

This study has revealed the importance of international involvement for enhancing global knowledge and understanding, and subsequently, the impact among Extension professionals, colleagues, clientele and family members. Those who have an opportunity to live and work in another country not only contribute to the development of that country, but they also contribute numerous mutual benefits within America. Lessons and practices have been learned from this study that will lead to enhanced international impact. Positive implications are more probable among participants as well as their families and near associates if they participate in programs that are properly designed and implemented. Furthermore, globally competent Extension professionals that are committed to Extension and its mission will result from implementing these principles.

There are a number of direct implications for those who facilitate international experiences. This study shows that there are three important professional development/training junctures for international assignments: before you go (pre-training), while you are there (reinforcement), and after one returns (de-briefing). Important information to share for pre-training aside from culture, logistics, health and other basic issues includes enabling family members to participate. Pre-training also needs to consist of guidance about communicating to colleagues and clientele before, during, and after an assignment. Important issues for reinforcement while on assignment include communicating to colleagues and clientele, and utilizing means to increase awareness and understanding of the assignment. Upon returning from an international assignment it is important to understand that the assignment needs to be incorporated into Extension work, to follow-through on things that commenced on the assignment, and to continue to tell the story of the international experience. It is vitally important for those who facilitate international assignments to convey to participants the important factors of a positive experience through pre-training, reinforcement and debriefing.

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What Stakeholders Want From the Land-Grant University: A Case Study of the Oklahoma State University Forestry Department

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Abstract

The 1998 Farm Bill mandated that land-grant universities collect stakeholder input when setting research, education, and extension priorities. This qualitative case study sought to collect stakeholder perceptions regarding their needs and expectations from the land-grant university. The researchers interviewed sixty-five men and women for the study. Faculty identified this purposive sample as legitimate stakeholders of the Oklahoma State University Department of Forestry. Results indicated that stakeholders were generally underserved in five basic areas. Stakeholders reported that (1) their information needs were unmet, (2) they did not go to the land-grant university for information, (3) the land-grant university was physically and psychologically distanced from the forested region of the state, (4) no forestry-trained extension educators were employed in the forested counties of Oklahoma, and (5) a communication gap existed between faculty and lay audiences. Stakeholders perceived that the land-grant university has failed to address their needs in applied research, education, and dissemination of usable information; underscoring indications by theorists, faculty, and federal law that the land-grant university has deviated from its original mission of serving stakeholders. Not collecting stakeholder input at every land-grant university will continue the trend toward programs that are insensitive to emerging needs of constituents. More importantly, the land-grant university may risk losing community support, thus subjecting itself to the criticism of irrelevancy.

Introduction

> "Today's basic research may well be tomorrow's applied research. Although this may be true, there is no justification for removing applied research, teaching, and extension to second-class status. It is essential that we create respect and equality for research, teaching, extension, and youth programs, and recognize the importance of integrating all aspects of the land-grant university system into aggressive and timely programs that address the needs of commodity and societal clientele" (Reynnells, 1999, p. 648).

The Morrill Act of 1862 established the land-grant university system in the United States. For the first time in the young nation's history farmers, artisans, merchants, bankers, technicians, scientists, homemakers, and engineers had the opportunity to earn a college degree on the same basis as clergymen, physicians, and lawyers (Kerr, 1931). The Hatch Act in 1887 provided funding for agricultural experiment stations so that the many related fields of the working class could be further explored. In 1914, the Smith-Lever Act provided funding for the Cooperative Extension Service (CES) to disseminate knowledge generated at land-grant universities to tradesmen (True, 1929).

Stakeholders of the land-grant university system (those who have benefited from the knowledge produced through experiment station research) have gained much over the past century. Americans are generally free of disease and starvation. Currently, three-fourths of all productivity gains in agriculture are a result of public investment in agricultural-related research and development. For every tax dollar invested in research and development, the return is at least $1.35 (Lechtenberg, 1998).

Because of the technological advancements made over the past century the majority of Americans are no longer connected to their agricultural roots (Kirkendall, 1986). It is not surprising, then, that taxpayers have demanded increased accountability from publicly funded research and development institutions. The 1998 Farm Bill (AREERA, Public Law 105-185) stated that stakeholder input must be collected when setting research priorities. Section 102, titled "Priority Setting Process", specifically stated (italics added):

> Effective October 1, 1999, to obtain agricultural research, extension, or education formula funds from the Secretary, each 1862 Institution, 1890 Institution, and 1994 Institution shall *establish and implement a process for obtaining input from persons who conduct or use agricultural research, extension, or education concerning the use of the funds.*

Soliciting stakeholder input has several advantages such as adhering to society's core values of equity and justice. It can also lead to a democratic conversation among participants that may result in resource and power sharing (Guba & Lincoln, 1989). Stakeholder input may lead to greater intellectual and social transformation among the research community and those who benefit from the knowledge (Mathie & Greene, 1997).

Kelsey and Pense (2001) conducted a study to develop a model for gathering stakeholder input for the Forestry Department at Oklahoma State University (OSU). The findings from this study resulted in a qualitative model that identified stakeholders, solicited input, and reported the findings back to departmental researchers and administrators for the purpose of better serving stakeholders. As the process of developing a model for collecting stakeholder input has been previously reported (Kelsey & Pense, 2001), the present study will describe the findings collected from stakeholders of the OSU Forestry Department and what the land-grant university should do to meet stakeholder needs when they are inconsistent with faculty reward structures.

Purpose And Objectives

The purpose of the study was to collect stakeholder input for setting research, education, and extension priorities at an 1862 land-grant university to be in compliance with the 1998 Farm Bill (AREERA, Public Law 105-185). Specifically this study sought to:

1. Identify stakeholders of the OSU Forestry Department.
2. Solicit stakeholder input for departmental research, education, and extension activities.
3. Determine the extent to which the land-grant university was meeting its original mission of creating and disseminating knowledge to the public.

Methods

The study utilized qualitative case study techniques (Merriam, 1998; Stake, 2000) to collect, analyze, and interpret the data. When using the case study approach, researchers collect extensive data on individuals and programs under investigation. The data included observations, face-to-face interviews, and document analysis. The researchers also spent an extended period in the field and interacted with stakeholders at various meetings and within their homes and places of business.

Data were collected from January to December 2000 from 65 citizens engaged in forestry-related activities, from artifacts, and through participant observation techniques advocated by Patton (1990). The interviews were audio taped and transcribed for verbatim accuracy. All interviews adhered to a flexible interview schedule that was developed in conjunction with the purpose and objectives of the study. The researchers engaged participants in probing questions, which evolved during the interview process to explore claims made by participants. Data were collected until no new themes emerged from the interviews based on negative case analysis (Guba & Lincoln, 1989).

The population for the study consisted of all individuals who had a stake in research and education programs offered by the OSU Forestry Department. The purposive sample was selected by asking Forestry Department faculty who their stakeholders were, by attending a forest utilization conference in Wagoner, Oklahoma, and with the assistance of the Idabel Forest Resources Center Station Superintendent, Mr. Bob Heinemann. Sampling was also accomplished utilizing the snowball technique; that is, stakeholders were asked to identify additional peers when interviewed by the researchers (Babbie, 1989) (Table 1).

The data were analyzed and reported using commonly accepted qualitative procedures (Creswell, 1998):

1. Organization of data. Facts about the case were arranged in a logical order.
2. Categorization of data. Categories were identified and the data were clustered into meaningful groups (coded).
3. Interpretation of codes. Specific statements that fell into like clusters (codes) were examined for specific meanings in relationship to the purpose and objectives of the study.
4. Identification of patterns. The data and their interpretations were scrutinized for underlying themes and patterns that characterized the case and allowed the researchers to draw conclusions.
5. Synthesis. An overall portrait of the case was constructed where conclusions and recommendations were drawn based on the data presented.

Because of their focus on a particular situation, case studies may not be generalized beyond the specific research parameters of the study (Yin, 1994).

Sixty-five men and women agreed to be interviewed for the study. The connection of the stakeholders to the forest industry fell into 12 categories including: non-industrial private forest landowners (NIPF) (n=15); state foresters (n=15); small forest industry employees (n=7); National Resource Conservation Service employees (n=5); private consultants (n=5); United States Forest Service employees (n=4); large forest industry employees (n=4); university employees (n=3); private land managers (n=3); employees of private organizations (n=2); an urban forester (n=1); and a forestry newswriter (n=1).

Table 1

Stakeholder Connection to the Forest Industry and Interviewee Number

Connection to the Forest Industry	n	Interviewee Number
NIPF	15	4, 7, 11, 12, 18, 20, 29, 30, 42, 44, 47, 48, 49, 61, 67
Oklahoma State Forester	15	5, 6, 8, 10, 14, 16, 17, 23, 25, 33, 35, 37, 43 (retired), 58, 68
Small forest industry	7	1, 3, 21, 54, 59, 60, 66
NRCS	5	19, 26, 26a, 26b, 38
Private consultant	5	36, 50, 55, 56, 57
USFS	4	26d, 28, 28a, 41
Large forest industry	4	9, 13, 39, 51
University employee	3	22, 27a, 27b
Private land manager	3	2, 24, 34
Private organization	2	31, 69
Urban forester	1	15
Journalist	1	45
Total	65	

Findings

In order to solicit stakeholder input and determine the extent to which the land-grant university was meeting its original mission of serving citizens with research-based knowledge, structured interviews were conducted face-to-face with participants in their homes and places of business. Five over-arching themes emerged from the content analysis of the interview data that pointed to the general perception among stakeholders that their land-grant university has underserved them. Stakeholders reported that (1) their information needs were unmet, (2) they did not go to the land-grant university for information, (3) the land-grant university was physically and psychologically distanced from the forested region of the state, (4) no forestry-trained extension educators were employed in the forested counties of Oklahoma, and (5) a communication gap existed between faculty and lay audiences.

Stakeholder Information Needs Remain Unmet by the Land-Grant University

Twenty-six participants (40%) stated that a lack of educational materials and experiences was a major problem for the forest industry. State foresters and private consultants most frequently cited problems under this theme. A lack of communication from OSU researchers, a lack of educational opportunities such as field days and demonstration plots, a lack of printed information written at the appropriate level, and a lack of locally produced research such as regional stand and yield tables were specifically mentioned by stakeholders.

A major problem faced by NIPF was ignorance of best management practices and sources for obtaining needed information for decision making. The following dialogue between the researcher and a NIPF illustrates this dilemma:

- Interviewer: As far as any problems that might come up with your job in hauling or with your trees, what kind of information might you use?
- NIPF #3: I don't know how to go about... (getting information).
- NIPF's son: He doesn't know. He doesn't even know where to go to ask (for help).
- NIPF #3: I just don't know what to do. I mean, I'm just out here.

Foresters and large industry personnel confirmed that NIPF needed more information to assist with forest management decisions. The largest void in information included markets and marketing opportunities for forest products, economic models for forestry production, and silviculture techniques appropriate for small tracts of land.

The lack of information dissemination was a concern among many stakeholders. One person reported that information needed to be published in lay terms, while others indicated that many NIPF were not getting information at all. One absentee NIPF who was interviewed at the forest utilization conference said he owned 2,500 acres and periodically logged small tracts. He felt that the university did not have any new information that would be useful to him stating "I haven't seen anything new in the last ten years. I don't think there is anything new that makes a tree grow faster" (NIPF #30). A few hours later, after he had attended a workshop presented by a university extension agent, the same NIPF reported that he was previously uninformed of new research-based information and exclaimed, "I was wrong! There is much new information I can benefit from!"

The researchers noticed while visiting the OSU Forest Resource Center that the CES fact sheets on display were undisturbed, wilted, and dust covered. A large forest industry representative commented on this fact as well. "A lot of them (fact sheets) are dusty and you can tell people are not using what has already been supplied." An experiment station researcher believed that an imaginary barrier existed around the station. He reported that few local individuals came to the Forest Resource Center for assistance but were eager to engage him at other locations in the community.

Many Stakeholders Do Not Go to the Land-Grant University for Information

Fifty-two stakeholders were asked directly if they used the OSU Cooperative Extension Services. Thirty stakeholders (58%) claimed that they had used OSU extension services. Three individuals confused the OSU CES with another organization. The remaining 19 individuals (36%) reported that they did not use land-grant university information to solve their forestry-related problems.

Of the 30 stakeholders who had used OSU extension services, five participated in a one-year master woodlands program designed for retired individuals that had just acquired land. Six stakeholders indicated they used the extension services minimally. Of the 52 stakeholders who answered the question, 22 (42%) had used OSU extension services extensively.

The Land-Grant University Is Distanced from the Forested Region of the State

Several stakeholders reported that OSU Forestry Department faculty ignored the southeast Oklahoma forest industry. Stakeholders expressed that the geographic distance of the university from the forestlands (over 250 miles) created a physical and psychological barrier between university researchers and people in forest-related occupations. Professionals in the forest industry further stated that the research focus of the Forestry Department tended to be on other areas of the state. Stakeholders specifically asked for the following from the OSU Forestry Department:

- Large forest industry representative #39: Geographically specific and species specific research.
- NRCS employee #26a: I'd like to see an extension agent's handbook with more information on the use of herbicides on forests. It's mostly geared toward central Oklahoma.
- Large forest industry representative #9: Eastern Oklahoma is being ignored. Studies on both forestry and wildlife are needed for the forest region of the state.
- Private consultant #57: There is a genuine interest in stand tables for the local areas, volume tables, those types of things. A lot of people are relying on information from other areas.

Several stakeholders recommended that OSU conduct research on silvicultural practices that are specific to southeast Oklahoma (private land manager #2; state forester #37; USFS #41; private consultant #56; private consultant #57).

No Forestry-Trained Extension Educators were Employed in the Forested Counties of Oklahoma

Stakeholders clearly felt disenfranchised by the fact that their current extension educator was not trained in forestry, but rather traditional plant and animal sciences. One stakeholder discussed the need for OSU extension service to do a better job of educating the CES agents and the public about forestry (university employee # 27a) within the three-county area that produces the third largest agricultural commodity in the state, wood products.

Seven stakeholders recommended that funding and staffing for forestry extension services be increased in southeastern Oklahoma. The seven respondents represented three state foresters (#6, #10, #37), two NIPF (#7, #29), a university employee (#27a), and a large forest industry employee (#9). OSU's failure to fill a position for a forestry extension educator that had been vacated seven years prior was perceived as a message from the extension service that stakeholder needs were considered a low priority by the land-grant university.

A Communication Gap Exists Between Faculty and Lay Audiences

Stakeholders perceived many communication barriers between themselves and the land-grant university; including, the geographical distance between the forested region and the university, the failure to have an on-site forestry extension educator, the lack of field days and demonstration plots, and the failure of faculty to conduct adequate geographically specific research for southeast Oklahoma. In addition to these issues, stakeholders felt marginalized and distanced from the university by the academic rhetoric in the land-grant publications.

A common theme among respondents was that publications currently produced by the department were too technical. Stakeholders expressed a need for research-based publications written at a lay level. A large forest industry employee (#39) stated:

> Well, I know you can go out here on these racks (where the fact sheets were located), and most of these guys who wrote these things were my professors. When you pull out one of those scientific deals, it is hard to even get through the abstract. A private landowner, unless he is the scientific type, is not going to get through that. It is really a loss on me, like the articles. One of the best (publications) is <u>Forest Landowner</u>, and it is a nationwide publication. Just this last issue a lot of what they had was geared toward wildlife and it's written in layman's terms where anybody can understand it but they have the research to back it up.

An NIPF echoed these concerns and asked the university to write reports in more user-friendly terms. "Most of the reports are written at too technical a level, work on publications that are written for the lay audience" (#47).

When specifically asked by the interviewer, three stakeholders agreed that field days sponsored by the OSU Forestry Department would do much to help bridge the gap between faculty and stakeholders in terms of communicating research results and building relationships (private consultant #36; state forester #37; state forester #8).

Conclusions, Recommendations, And Implications

This study sought to collect stakeholder input for setting research, education, and extension programming priorities in one academic department at a land-grant university as mandated by the 1998 Farm Bill. Stakeholders reported that their needs centered on issues of agriculture production, business skills, and management practices. Stakeholders were interested in learning more about best management practices for timber production and marketing strategies for their products in southeastern Oklahoma. Stakeholders also reported that the majority of printed information provided to them through the OSU CES was too technical and of little use for their day-to-day problems. They requested more face-to-face interaction with CES employees who were knowledgeable about forestry production techniques and marketing possibilities.

What stakeholders want from the land-grant university is a flow of communication, both written and oral, that is easy to access, appropriately written for the lay audience, timely, and of high quality that addressed their needs. What Forestry Department faculty have provided these particular stakeholders has been basic research that was conducted in regions other than the forested areas of Oklahoma, publications that were written for other scientists (which were never read by stakeholders), and absentee advice delivered through a county extension agent whose expertise was not in forestry (Kelsey, Pense, & Mariger, in press).

The OSU Forestry Department stakeholders perceived that the land-grant university has failed to address their needs in applied research, education, and dissemination of usable information; underscoring indications by theorists, faculty, and federal law that the land-grant university has deviated from its original mission of serving stakeholders at the most applied levels (Bavaro, 1995; Boyer, 1990; Cardozier, 1991; Fox, 1992; Hunt, 1993; Rice, 1991; Scott, 1993). Given the legislative mandate of the 1998 Farm Bill for including stakeholder input into research, education, and extension priority setting activities, stakeholder involvement should be implemented by individual departments of land-grant institutions nationwide. Implementation would result in increased accountability for publicly funded research, increased communications between land-grant faculty and their constituency, and would assist in identifying research and education topics that are valued by stakeholders.

During conversations with Forestry Department faculty, it was established that the current university reward structure was to blame for the misalignment between serving stakeholders and earning tenure and promotion (Kelsey, Pense, & Mariger, in press). Faculty reported that doing research on a local and applied level lead to few publication opportunities in prestigious venues. Given this situation, the faculty reward structure should be reconsidered to equally recognize faculty pursuits in research, education, and service as mandated by the original land-grant mission (Fugate, 1996).

Not collecting stakeholder input at every land-grant university will continue the trend toward programs that are insensitive to emerging needs of constituents. More importantly, the land-grant university may risk losing community support, thus subjecting itself to the criticism of irrelevancy and the loss of financial support from state and federal sources.

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A Historical Narrative On The Impact Of The New Farmers Of America (NFA) On Selected Past Members

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Abstract

This paper, "A Historical Narrative on the Impact of the New Farmers of America (NFA) on Selected Past Members", establishes a written historical narrative on issues relating to the impact the NFA had on past members of the NFA, and to gather detailed background information on the NFA. It includes detailed interviews from past members and references pertinent information found in archives and texts.

The research objectives for this study were: (1) to determine what activities of the NFA contributed to or distracted from the leadership development or success of the NFA member as a leader, (2) determine what impact has the NFA (versus other sources) had on the development of each past NFA member as a leader, and (3) and to determine what aspect(s) or program(s) of the NFA (that was lost after the merge r) could be incorporated into the FFA where minority issues are of concern.

Major findings of this study were: (1) the participants believed that the agricultural teacher played an important role in their leadership development that helped them to lead and manage programs, and develop human relation skills, (2) the participants believed that the NFA and the FFA were similar, but after the merger there was a lack of Black leadership in the FFA organization, (3) the participants expressed the notion that neither Black nor White teachers were doing as much for all students after the merger and that the interest of the student was no longer a priority for many of the teachers, and (4) the participants believed that the merging of the two organizations was inevitable due to societal and educational integration that was going on in the 1960s.

Based upon the conclusions it was implied that a lack of forethought and effort in maintaining Blacks in leadership positions led to poor morale and a loss of identity among Black students enrolled in the FFA; therefore the National FFA Organization should hire an outside agency to determine the accessibility of leadership positions to professionals of color. Furthermore, the agency should publish their findings and recommendations for review by the FFA Board of Directors and its members.

Introduction/Theoretical Framework

The National Vocational Education Act of 1917 established federal funding for courses in agricultural education. Shortly thereafter, the original idea for the Future Farmers of America (FFA) organization was initiated. The FFA was open to all races, but due to segregation, most Blacks were not able to participate. For many years separate schools in a number of states were provided for Black students. It was not until 1964 when Congress passed the Civil Rights Act that prohibited segregation in public schools that all Negro students enrolled in vocational agriculture could become members of the Future Farmers of America (FFA) nationwide (Tenney, 1977).

The New Farmers of America (NFA) was an organization of Negro farm boys studying vocational agriculture in the public schools throughout 18 states in the eastern and southern United States. The NFA started in Virginia in May, 1927 with a few chapters and members, and concluded in 1965 with more than 1,000 chapters and more than 58,000 active members (Strickland, 1995). From 1928-1935, all NFA associations were known only by the name of each respective state; for example, N.F.V. designated the "New Farmers of Virginia." All of the other states were similar (New Farmers of America, 1963).

On August 4, 1935, a special group of Negro farm boys and their advisers met in Tuskegee with the idea of establishing a National Organization of the NFA. Seven years prior to this meeting a small group of White farm boys met on November 20, 1928 for the same purpose; establishing a national organization. They called their organization the Future Farmers of America (FFA). The Negro group met to organize a national organization, but the difference with this was the Future Farmers of America was nationwide in representation, whereas the Negro organization was mainly regional (Strickland, 1995). In August of 1935, representatives from all the State Associations met and formed the National Organization of New Farmers of America with a tentative constitution and by-laws (New Farmers of America, 1963). Establishing a national organization was an important step in the development of the New Farmers of America Organization, because state association members were now a part of a national organization that was made up of similar groups of agricultural students from the other States represented (New Farmers of America, 1963).

The NFA was an organization designed to develop the qualities of leadership and citizenship of its members by allowing them to participate in conducting meetings, sharing in carrying out the program of activities of the chapter, and serving on committees (Tenney, 1977). The organization afforded its members many opportunities to develop leadership that was very essential for their success as a modern farmer. These leadership abilities were developed through public speaking, judging, chapter contests and from the training received through the work of the chapter committees under the supervision of the local adviser (New Farmers of America, 1963).

A decade after the Smith-Hughes Act in 1917, African Americans in these professional fields increased rapidly (Bowen, 1994). After the federally mandated desegregation and state compliance efforts of the 1960s ended, the infrastructure that maintained substantial numbers of African Americans in agriculture declined drastically (Bell, Powers, & Rogers, 1987). With the decline in African Americans in key roles, membership in the agricultural sciences has steadily decreased for African Americans in agriculture (Bowen, 1994). Prior to 1965, the idea of merging the NFA and the FFA was presented to both organizations. After numerous meetings and skepticism between the organizations, the merger was approved (Tenney, 1977).

History can be one guide in determining what has led to the decrease of African American students in the FFA organization. FFA membership is one-fourth female, two-thirds non-farms (National FFA Organization, 2000), and less than five percent African American

(Moore, 1994). Prior to the 1960s African American agriculture teachers served as strong community leaders. Once these teachers vanished their leadership roles were not sustained by the agriculture teachers who replaced them (Bowen, 1994).

Focusing on diversity is a major issue in today's society. One way of looking toward the future is to look back at the past to see what may have led to the decline of African American students in agricultural education. The emphasis on diversity and pluralism continues to grow in recognition of demographics, economics and social changes taking place in the United States today (Ingram & Nyangara, 1997). "Some could argue that the focus of future diversity efforts should be on enrolling more minority students and increasing membership in the FFA where programs are currently being offered" (Moore, 1994, p. 14). Larke (2000) stated "One of the big questions is how do we sensitize non-minorities to the need, get them to take ownership of the challenge and recruit students of color" (p.9).

It is important that history be remembered, as the NFA was a thriving organization prior to the merger in the 1960s (Norris, 1993; Strickland, 1995). The agriculture teachers at that time are either retired or near retirement and the NFA and FFA members involved at that time may have fading memories of the specifics of the events. From 1964-1966, virtually no articles were published in <u>The Agricultural Education Magazine</u> about the 1965 merger (Bowen, 1994). Radhakrishna (1998) reported that of the 701 papers presented at the National Agricultural Education Research Meeting (NAERM) over its 25-year history, 14 had women or minorities as a subject matter topic. Of these 14, only two were presented in the 1980s and none in the 1970s. Further, from 1986-1996 only seven journal articles with the subject matter topic of women or minorities were published in the <u>Journal of Agricultural Education</u> (Radhakrishna, 1997).

To understand the years surrounding the NFA and FFA merger of 1965, some background information is useful. There were several laws passed beginning in the 1890s that had a direct effect on integration in America. The two major lawsuits in history that had a major effect on integration and the Civil Rights Act are discussed.

Plessy v. Ferguson

No other institution has been more influential in the lives of Black Americans than education (Adair, 1984). For many years, separate schools in a number of states were provided for Black students. Adair (1984) stated, "You must understand that 'separate but equal' was neither sought or realized as Plessy v. Ferguson mandated. This 'separate but equal' clause derived from the Plessy v. Ferguson lawsuit. The Plessy v. Ferguson case brought justification for segregation in public facilities across the country, including schools" (p. 34).

On June 7, 1892, a Black shoemaker named Homer Plessy was put in jail for sitting in a "White" car of the East Louisiana Railroad. Plessy was seven-eighths White and one-eighths Black, but under Louisiana law, he was considered Black, requiring him to sit in the "Colored" car. After going to court, Plessy was found guilty in the state court, the Supreme Court of Louisiana, and the Supreme Court of the United States for refusing to leave the White car. The U.S. Supreme Court ruled that Tennessee's "separate but equal" facilities on railroad cars are constitutional. The judge at the trial was John Howard Ferguson a lawyer from

Massachusetts. This case set the precedents that separate facilities for Blacks and Whites was constitutional as long as they were equal. It was argued that "separate but equal" facilities do not offend any provision of the Constitution of the United States. In this case the legislature of Louisiana passed a law which required that all railroads prove "equal but separate" accommodations for Whites and Blacks and forbade the mixing of the two races. This ruling affected Blacks for over a half century (1896 – 1954) until overruled in the May 17, 1954, Brown v. Board of Education decision (Adair, 1984).

Brown v. Board of Education

The public schools functioned on the basis of the Plessy Doctrine of "separate but equal" until May 17, 1954 at which time the Brown decision came before the Supreme Court (Mercer, 1971). Repeated studies were revealing that there was a great gap between Negro and White schools of the South in the quality of education (Bouma & Hoffman, 1968). Student teachers of White teacher education institutions, prior to May 17, 1954, engaged in student teaching in White schools and vice versa for Black student teachers (Mercer, 1971). All was changed as the result of the decision of the Supreme Court on May 17, 1954 in the Brown v. Board of Education of Topeka.

A Black family challenged the segregation policies of the Topeka school system. A student, Linda Brown, living just two blocks from a local area school had to travel twenty-one blocks to school. The National Association for the Advancement of Colored People (NAACP) saw this as an excellent opportunity to challenge the Separate but Equal policies of the Plessy v. Ferguson decision. They would argue that the Fourteenth Amendment indicated that the policy established by the 1896 Plessy v. Ferguson ruling was unconstitutional. Thurgood Marshall presented this before the Supreme Court. When the decision came in, all nine justices voted that the policy of Separate but Equal was unconstitutional. The courts ordered immediate desegregation of public schools (Pratt, 1992). "As the bombing of Pearl Harbor was to the entire nation, so the Brown decision was to the White South – an assault to be recorded for posterity as yet another event that would live in infamy" (Pratt, 1992, p. 121).

In 1954, the U.S. Supreme Court buried the "Separate but Equal" doctrine under the Brown v. Board of Education of Topeka lawsuit. The decision in this case was that "separate but equal" had no place in public education (Adair, 1984). The Brown decision led to the integration of schools throughout the United States. The most noted was the integration of Little Rock Central High School in Arkansas. Nine Black students were selected to attend a public school in Arkansas and were faced with a very hostile environment to the point where they were protected by the United States Armed Services. After years of struggle, the school was eventually integrated and the first Black student received his degree (Peterson et al., 1978). This crisis in Little Rock had a profound impact on America and the rest of the world. It provided proof of the lengths to which some Southerners would go to prevent integration.

Civil Rights Act

The Civil Rights Act was a lengthy debate that was fought by southern congressmen, but inevitably a change in society was to come. Change is what happened with the reception of this bill. This bill forbade discrimination in all public accommodations, which included restaurants, motels, sport arenas and theaters. It permitted the Department of Justice to file suit "for the orderly achievement of desegregation in public education" (Pratt, 1992, p. 23). The Civil Rights Act of 1964 legalized integration and allowed freedom of choice in the southern states. Because of this Act, the faculty and student bodies in the south were integrated (Mayberry, 1991). The Civil Rights Act of 1964 was pushed by the Department of Health, Education and Welfare and it helped train teachers and other school personnel in handling desegregation problems (Bouma & Hoffman, 1968). The Civil Rights Act was the most significant piece of legislation to date, and it has had a lasting effect in the elimination of discrimination and segregation (Hill & Feeley, 1967). Adair (1984) wrote:

> On the other side of the struggle was the NAACP exerting unconditional pressure on school districts to desegregate 'with all deliberate speed'. In 1964, jurisdiction for enforcing the desegregation mandate was transferred from the courts to the Department of Health, Education and Welfare (DHEW). It was felt that desegregation was too slow under the courts. School districts were to submit progress reports to DHEW on desegregation efforts in their schools (p. 58).

The Department of Health, Education and Welfare, under the directions of the President of the United States, played an important role in the merging of the FFA and the NFA due to their involvement with sending letters to both organizations requesting for a joint meeting of the groups (Wakefield & Talbert, 2000).

Purpose/Objectives

The purpose of this study was to select and interview past members of the NFA in establishing a written historical narrative on issues relating to the impact the NFA had on these individuals and to gather detailed background information on the NFA.

The research objectives for this study were:

1. What activities of the NFA contributed to, or distracted from, the leadership development or success of the Past NFA Member as a leader?
2. What impact has the NFA (versus other sources) had on the development of selected Past NFA member as a leader?
3. What aspect(s) or program(s) of the NFA (that was lost after the merger) could be incorporated into the FFA where minority issues are of concern?

Methodology

To obtain the data of recording historical narrative from past members of the NFA, interviewing was utilized to accomplish the objectives of the study. The purpose of interviewing was to find out what was in and on someone else's mind. Interviewing allows the researcher the opportunity to find out those things that cannot be directly observed. Patton (1990) stated that we cannot observe behaviors that took place at some previous point in time, situations that preclude the presence of the observer, and we cannot observe how people have organized the world and the meanings they attach to what goes on in the world.

The researcher has a distinct and active role in this process. In their qualitative research applications, interviews are often applied because the study's underlying theory is too complex to quantify with traditional methods, too insufficiently developed, or too narrowly interpreted. In other words, interviews often better fit the study's theoretical question and analytical situation than do more traditional experimental or survey designs (Lee, Mitchell, & Sablynski, 1994).

One purpose of this paper was to create dialogue about the NFA. The researcher interacted with the written word by agreeing, disagreeing, or posing other points. It was important for the researcher to respond to what was written and not take what was written at face value. It was necessary for the researcher to question, reflect, and react. "Oral personal narratives occur naturally within a conversational context, and often the performance of one narrative leads to other related performances" (Boland, 1979, p.71).

Interviewing is one of several techniques for gathering data about past events, figures, and movements. Oral history seeks to record on tape the ideas, impressions, and knowledge of persons who might not otherwise leave any kind of written memoir. Oral history interviewing is not a substitute for written history, but compliments traditional sources of materials used in reference to the past. Boland stated, "The greatest advantage of oral over written documents is that the historian actively participates, as interviewer, in creating the oral document, and therefore he can try to get the information he needs" (p. 121).

An interview guide was developed and used by the researcher for all interviews. The interview guide was developed by the researcher and input was received from agricultural education professionals from Purdue University and past members of the NFA not involved in this research study. The participants selected were selected by using snowball or chain sampling. Snowball or chain sampling is a method used for locating information-rich key informants (Patton, 1990). "These are individuals whose names come up repeatedly in talking to different well-situated people, and these selected individuals would make a highly credible sample" (Gall, Borg, & Gall, 1996, p.234).

On October 23, 2000, a memo was sent on the email listserv to all American Association of Agricultural Educators (AAAE) members and the email listserv to all Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) members referencing information pertaining to past NFA members. From the responses received, nine participants were chose to be interviewed. All of the members selected were past NFA members. All participants were interviewed in person.

Data were analyzed using triangulation from reviewed materials from the archives; gathered materials from books, articles, and magazines; and reviewed transcripts from the interviews. The researcher compared information received from the participants, for accuracy purposes, to data found in the texts and archives. The interview transcripts were consistent with the findings retrieved from the archives and the texts.

Results/Findings

Research objective one sought to determine what activities of the NFA contributed to or distracted from the leadership development or success of the Past NFA Member as a leader? The following research questions were used to achieve this objective.

Research question one: What roles did the NFA play in the school/community where you resided, or worked?

Responses are as follows: "The NFA played very significant roles because their people were in rural communities and many people were not mindful of the activities that were a part of the NFA. The teacher of agriculture would travel throughout the community, visiting homes with the students, working with adults bringing them into the program, and then they became familiar with activities of the NFA and developed an appreciation for what it was doing for their sons." "It served as a motivating force in their lives. It served as a vehicle for competition, where they could compete, and competition made good men and women out of everybody that past through that program." "It helped students become leaders in not only the school but in the community as well." "The NFA was bigger than football in a rural community today, if you can picture that. In that sense, I mean that every sector in the community really valued and respected and had a high regard for the NFA. They knew that it was a part of our lives and one major vehicle to help young men to grow, to understand themselves, to understand the community, to set some goals for themselves, and to learn team and leadership skills." "In the school and community the NFA was number one. You were seen throughout the community and the school because you did go to the other classrooms and put on demonstrations, and did community service."

Research question two: What job skills, leadership skills, and values did you gain from your participation in NFA activities that contributed to your career and/or leadership?

Responses are as follow: "I developed leadership skills with the ability to lead and manage people and programs, and the most important thing is developing human relations skills, being able to work with and getting along with people and to work together as a team. Taught us how to develop that brotherly love. That permeated the community." "The NFA gave me what I needed to reach the point that I am now. It gave me the inspiration, it gave me the hope, it gave me the encouragement, it gave me the push, it gave me the enthusiasm, it gave me everything that I needed in order to be a successful person in order to render the kind of service that I need to succeed. It was responsible for my becoming the Executive Secretary of the NFA, my becoming the Director of Camp John Hope, because I had the leadership ability to do what was needed at that time." "I think one of the key things I received in the term of leadership skills was the ability to get up and speak before a group. Public speaking was one of those things that they stressed a lot and I find it to be very helpful today." "I guess those jobs skills really contributed to why I am an agricultural teacher today. My agriculture teacher brought a few of those hidden skills out of me. I had learned them on the farm, but during that time you were trying to get away from the farm and I found out I couldn't get away from the farm." "All those experiences I learned from living on a family farm and every time I looked up, the agriculture teacher was out there visiting. He was concerned about us." "The NFA had more to do with my success than any thing that I can think of in addition to my parents. The high school agricultural teacher played a key role as well." "The more people you could involve the more you would keep out of trouble, so they came up with these positions. Involving all these people would provide more leadership training for more people."

Research objective two sought to determine what impact has the NFA (versus other sources) had on the development of each past NFA member as a leader. The following research questions were used to satisfy this objective.

Research question one: What were some of the contests/activities that you participated in as a NFA member?

Responses are as follow: "Public speaking, parliamentary procedure, shop contests, tool identification, livestock judging and many others." "I participated in landscape judging, parliamentary procedure, livestock judging, forest field day, and one of the most rewarding one was public speaking. I enjoyed that more and public speaking really gave me a push toward the goals that I had set." "The only contests that I remember were public speaking, livestock judging and quartet." "The NFA Ball and Quartet." "Public speaking contest. During that time we didn't have something in front of you that you read from. You memorized, and then you came back the next day knowing half of it and then the next day you knew it all. So public speaking was number one that sort of stood out. Another one was the NFA quiz contest. Where you learned about your history and the background of the NFA and then the Proficiency Contests with the shop work."

Research question two: What were some of your experiences as a NFA member?

Responses are as follow: "NFA got me my first trip to Greensboro, North Carolina. We only lived 45 or 50 miles from Greensboro, but I never visited Greensboro, so my first visit to Greensboro was by way of participating in a state convention held on this campus. That must have been in 1962… I think it was." "The year I served as National President, if the National President of the FFA came to speak at our National Convention, we did not know about it. It was one great experience to hear about Benjamin Mays [Mays is a Baptist Minister, the sixth president of Morehouse College, a mentor to Martin Luther King, Jr., and he delivered the eulogy at King's funeral] at the Civic Center. It was a tremendous experience. I didn't see too many white faces." "We didn't know anything about the FFA Magazines." "Wearing those black and gold NFA jackets. Before you wore that coat you had those eggs in your pocket. You didn't know whether they were boiled or not. You had to go through that initiation. The upperclassmen would come to school initiation day if no other. I don't know what lie they told, but every one of them came to school, because you would get beat and that was a part of it. You would run down this long line. They would be standing on each side. There would be a week of it. Them rascals could come to school that day with those belts soaked down and if you were a freshman and you were trying to talk to somebody's girlfriend, they would put the word out there and them rascals would kill you."

Research objective three sought to determine what aspect(s) or program(s) of the NFA (that was lost after the merger) could be incorporated into the FFA where minority issues are of concern. There were four research questions used to satisfy this objective.

Research question one: What did you see as the primary differences between the NFA and FFA?

Responses are as follow: "The FFA limited the participation of Black students in youth activities because Blacks don't have the opportunity to be leaders in the organization like they did when the NFA was there." "The Blacks were the leaders in the NFA. I wish we could develop the FFA to get more Black involvement as officers because Blacks are missing that experience." It was very difficult to receive awards in the FFA. See the Black students felt like the NFA was their organization and they didn't see the FFA as being their organization as much as they did back then." "One of the things I think when we look at the differences sometimes in the merger, I know that the NFA teachers were very dedicated and motivated and they worked extremely hard to make sure that their students understood their roles and responsibilities. People along there with me would take a student whether they were Black or White and try to push them to the max, but agriculture teachers after me that didn't have no dealings with the NFA wouldn't push a student to the max. I guess because they didn't know how to push Black students. Most teachers doing that time expected all of the kids to succeed." "Now when I started teaching school in an integrated system in Virginia, what I didn't see was that all the kids were expected to succeed. It seemed like they had given up on some of the kids and I know for a fact that when we merged that some of the teachers certainly gave up on some of the African American kids." "We had more chances at leadership before the merger. Most of the students that participate in contest are White students. Most of the officers are White students. The Black students could do it, but they don't have the chance."

Research question two: What was the atmosphere like in agricultural education when the two organizations first merged?

Responses are as follow: "The Blacks were demoralized. The morale went down, because they felt as if they had lost something. So at that time I was hoping that they would change the name of the FFA. It was called the Future Farmers of America. So we were hoping at that time they would change the name from Future Farmers of America to Future Agricultural Leaders of America or FAA Future Agriculturalists of America, but there were many old timers that had been around for a long time and just didn't want to change. Because at that time the blacks felt like they were not giving up anything. The NFA...gone forever." Rather than a merger, many saw it as absorption; they were absorbed rather than merged. We had Booker T. Washington and H.O. Sargent. The only thing they kept was the H.O. Sargent." "The atmosphere was tense, it was very tense on the part of teachers, on the part of students, and on the part of administrators. The reason it was tense was because nobody wanted to hurt nobody's feelings and as a result everybody was kind of tense." "They were two organizations coming together. There will always be some reluctance from both parts. If you are not a change agent, when the word 'change' come about maybe the FFA/NFA people said that we were going to lose our identity." "I think the merger was because of the courts. They had mandated that in Virginia they were going to integrate the schools and because of that I think the two groups came together. If the courts had not mandated that they integrate the schools, we might even today still have separate organizations and have separate schools. So it goes back to the concept of looking at things from a broader perspective. There comes a point of time you have to ask a question to the issue of whether it was a good idea or not? This is my personal opinion." "I think the group that really lost out in integration was the average African American kid, because your educated kids succeeded prior to integration and to a degree succeeded through integration. In the state of North Carolina it started with the teachers. Let's go ahead and get the teachers merged as an organization and as a group before we bring the kids together and so forth. We had a hassle at the state level as far as merging the teachers in the organization. This is when some of the teachers came out and was concerned with having Blacks in leadership positions rather than having the Whites come in and take over everything." "Do you remember 1954 when they came out with segregation as being wrong, but yet it was in the 1960s before we got around to doing anything about it. If they did not merge together monies would be cut." "We sort of had a guarantee that we would have someone in one of those positions that they were going to put a Black beside a White. It was a promise in the beginning and then around two years down the road they sort of forgot about that promise that was made." "When we first started we had all these Black teachers and after a year or two they forgot them." "There was a time when there was two Ag. Teachers, one Black one and one White one and the checks would be different." "Some of the experiences we had with the supervisors and so forth, Black supervisor were not able to go into a White teachers' classroom and even suggest anything to them." "Change was very tense. The end results were that there were a lot of promises that were made that were not kept and the NFA was swallowed up rather than merged."

Research question three: What strategies were used to get NFA students involved in the FFA?

Responses are as follow: "We didn't have much of a choice. What strategies????" "It took the attitude of the teachers to talk with them and encourage them to join the FFA just like they did the NFA. Instead of saying NFA, we'll just say FFA. It was the attitude of the teacher of agriculture." "In the NFA, activities and leadership were very important components and that helped make many of us what we are today, because of the leadership development component of the program." "It was due to integration and integration had to come when it did." "The strategies used to get students motivated in the FFA was to explain to them the full meaning of it, the advantage of it, and the purpose of it. It was explained that it is an opportunity to get out in the community and compete with people outside the community, outside of the state, and in the nation, and it's a good vehicle for the development of young minds." "I think the strategy had to come from the agricultural teacher. If that agriculture teacher was enthusiastic and involved in that program, you wouldn't have that problem back then." "It took Virginia four years to get its first African American state officer. This is where the FFA began. That would tell you if there was much done for African Americans in the FFA. When you bring African Americans to state conventions and you do not have African American in leadership roles, what message does that give to the other African American kids that are there?" "We tried to encourage kids to join. It became more difficult to get minorities to join the FFA because of the money for district contest, dues...kids sort of drew away."

Research question four: What things were lost in the merger that may have been significant enough to retain that could help benefit minority involvement in the FFA today?

Responses are as follow: "One of the things that were lost was contact. Contact with Black leadership. After the merger many positions in southern states, many leadership positions in southern states were phased out. We didn't have the Black leadership in states that you didn't have the NFA, and as a result we didn't have that Black leadership push for our young people. It's a different kind of push when White pushes Blacks. It's not as effective as Black encouraging Blacks, so most of the states, I would say all of the southern states lost positions of state leadership on the part of Blacks and as a result many of the Black students now are suffering for that kind of leadership and that kind of push that we had when I was in there and when other Black leaders were there to encourage them." "The lost of historical information. Students who come through today through the FFA unless they get a person who would tell them about the NFA, probably would not know about them." "One of the things that we could do as I look back can come from the standpoint of a teacher. He showed a genuine interest in you. Having a teacher that really cared about you, stood behind you, and motivated you. In the old days that agricultural teacher would take you in his car and carry you up to the university. It usually does not happen like this anymore." "One of the things would be some of those contests, for example, at that time we had the quartet and it was very big. From what I understand a lot of singers came from those NFA quartets. That quartet was about one of the only things that I can see right now that would be significant enough to maintain." "At one point in time there were only a few activities for students to become involved in, but as time goes on kids could become involved in other things. Looking at the figures of African Americans in the FFA after the merger, the figures speak for themselves. I don't know how you overcome that data. Could you imagine what it would have been like if the first black National president had come along earlier? It was 20 years after the merger before we got the first Black president, and none since." "That closeness between teacher and student seems like it sort of faded away. It meant something, that relationship between student and teacher and seems like some of that has just faded away and may not be there in this day and time." "I felt like for a long time as a teacher I was a teacher without a club. I was a NFA member when I left my high school, then when I graduated from A&T I was teaching about the FFA and I really just didn't feel like I was a part. When we went to Raleigh and they were discussing the merger, there were some pretty heated discussions going on down there. I taught about the FFA, but personally I had a hard time feeling like I belong because the closeness wasn't there. Mr. Evans came by our house to visit and if he and my daddy decided something, I had no vote. The closeness was because my daddy trusted Mr. Evans. That was lost after the merging process." In some cases even now, some of the White teachers may be afraid to get too close to work with minority individuals."

Conclusions/Recommendations/Implications

The NFA was an organization that had a full history of accomplishments and was a thriving organization prior to the merger in 1965 with the FFA. The purpose of this study was to select and interview past members of the NFA in establishing a written historical narrative on issues relating to the impact the NFA had on these individuals and to gather detailed background information on the NFA. Data collected from a selected group of members, archives and limited written texts were analyzed to accomplish this purpose.

When asked what activities of the NFA contributed to or distracted from the leadership development or success of the Past NFA member as a leader; what impact has the NFA had on the development of each Past NFA member as a leader; and what aspect(s) or program(s) of the NFA could be incorporated into the FFA where minority issues are of concern, all the participants agreed upon these conclusions. The participants believed that becoming actively involved in the NFA contributed to their leadership development, the agricultural teacher played an important role in their leadership development, and the NFA had a major effect on them today. They all agreed that after the merger there was a lack of Black leadership in the FFA, it became more difficult for Black Students to gain leadership roles in the FFA, the merger was inevitable, and the attitude of the teacher determined the smoothness of the transition after the merger.

This study implies that based on the Civil Rights Act of 1964,which prohibited segregation in public schools throughout the United States, the Department of Health, Education and Welfare sent letters to the NFA, NHA, FFA, and the FHA to force them to integrate. If schools under the organizational structure chose not to integrate, the State Department asked each association to consider eliminating funding to these schools.

The merger led to the union of Black and White agricultural students and teachers in schools throughout the United States. It was found that many of the Blacks that were involved in the merger felt that it was inevitable that the organization merged due to time. The participants felt that the merger was a good thing for the organization because they had a lot to learn from the FFA members as well. It was a perception prior to and after the merger by the members that the merger would not place Black representation in the FFA at a level equivalent to Whites. Participants believe that this had an influence in the decline of Blacks in agriculture and the FFA.

Based upon these conclusions it can be implied that a lack of forethought and effort in maintaining Blacks in leadership positions led to poor morale and a loss of identity among Black students enrolled in the FFA.

It is recommended that additional research be conducted to include a larger sample of the population of past NFA members for historical documentation, the National FFA Organization should look into the promises made to the NFA Organization and develop goals that would increase the morale of Blacks in agriculture, and additional research be done to document day-to-day operation of the NFA at the local, state and national levels to be presented to the National FFA Center for showcase.

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Engaging Students in the Agricultural Education Model: Factors Affecting Student Participation in the National FFA Organization

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Abstract

Although previous studies have explored why students enroll in agricultural education classes and why they join the FFA, little literature has been published on the involvement of students once they join the FFA. The purpose of this study was to determine the degree of engagement of agricultural education students in the FFA, their agricultural education courses, their high school courses, and agriculture. This descriptive study using self-administered mailed questionnaires had a 52% useable response rate from FFA members and a 63% useable response rate from non-members.

FFA members more than non-members had a higher percentage that were current or former 4-H members, a higher percentage that had parents or siblings who were in agricultural education or 4-H, and a higher percentage self-reported that they lived on a farm. A higher percentage of FFA members than non-members reported that they had an SAE. It is recommended that efforts to diversify FFA membership to students outside of traditional agriculture demographics be continued. However, these efforts should not de-emphasize traditional aspects of FFA to the detriment of these core traditional agriculture students.

FFA members more than non-members believe that their agriculture classes are preparing them for the future, are challenging, interesting, exciting, and allow for open discussion. It is recommended that methods be identified to convince non-members of the value of their agricultural education classes, so they will find those classes more challenging, interesting, exciting, and of more importance. Another recommendation is that all agricultural education students be counted and treated as local FFA members and all agricultural education students receive instruction in career exploration and on career opportunities.

Almost one-third of the FFA members reported that they had not received any award in FFA and almost one-half checked that their highest office was that of committee member (which was the lowest level of participation listed for that question in the survey). Two-fifths had never participated in a CDE, one-half had never participated in a leadership event, and two-thirds had never completed a proficiency award application. One-third did not have an SAE at the time of the survey. A recommendation is that agriculture teachers should actively involve a greater percentage of their current membership. This will spread the benefits of FFA involvement to more members and may help in recruiting agricultural education students who are not FFA members to join.

Introduction

The agricultural education program has three integral, intra-curricular components: classroom/laboratory instruction, experiential learning through supervised experiences, and FFA (Dailey, Conroy, & Shelley-Tolbert, 2001). The FFA is the youth organization component for students studying agriculture in public secondary schools. The main tenets of the FFA are found in the organization's mission: "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" (National FFA Organization, 2000, p. 6). Staller (2001) postulated that, of the three how-we-teach components of the agricultural education program, the FFA is the more intense component for strength of learning on life skills.

Active membership in FFA is open to all students enrolled in a secondary agricultural education program (National FFA Organization, 2000, p.6). However, total membership inconsistent with total students enrolled in agricultural education has confounded those closely associated with the National FFA Organization. Of an estimated 800,000 agricultural education students today, only about 450,000 receive educational benefits as members of the FFA (Stagg & Staller, 1999). Secondary agricultural education teachers have long perceived the benefits of membership in the National FFA Organization for their students. However, concern exists for the lack of perceived benefits of membership in the National FFA Organization for many of the students enrolled in agricultural education. Renewed discussions concerning the need for FFA and agricultural education have taken center stage in issues of Volumes 71 and 72 of *The Agricultural Education Magazine* where questions have been posed to clarify the need for public school agricultural education and the FFA in the 21st century.

Conceptual Framework

Studies published in the 1990s identified factors influencing students to enroll in agricultural education courses. Marshall, Herring, and Briers (1992) found that students enrolled in agricultural education because of characteristics of the class. Reis and Kahler (1997) found that parents, the agriculture teacher, friends, and former agricultural education students were the most influential people for enrollment decisions. Hoover and Scanlon (1991) determined that the image of agricultural education, the FFA, and the agriculture profession in general were the greatest barriers for students not enrolling in agricultural education.

Research findings also lead to conclusions explaining why some agricultural education students join the National FFA Organization and others do not. Connors, Moore, and Elliot (1990) found that the most important factor influencing non-members to join the organization was their interest in agriculture, while the barriers for agricultural education students not joining FFA included their level of interest in agriculture and the future value of the FFA to their career. Gliem and Gliem (1999) reported that class rank, year first enrolled in FFA, interest in agriculture, former family membership in FFA, teacher enthusiasm for FFA, and including FFA activities as part of the classroom instruction were significant predictors for whether a student would be an FFA member or non-member. Croom and Flowers (2000) found that for first-year North Carolina agricultural education students the perceived image of the FFA in their school, whether positive or negative, influenced the student's decision whether to join the FFA.

Gliem and Gliem (2000) using exploratory factor analysis and a national purposive sample developed models for factors that encouraged, discouraged, or would encourage students to join the FFA. For students who joined the FFA a three-factor model of perceived personal development opportunities, positive image of the FFA, and family members who were former FFA members explained the motivating factors for joining. A four-factor model of negative image of the FFA, perceived lack of value of the FFA, time commitment ofthe FFA, and knowledge of the FFA explained the motivating factors for not joining. A five-factor model including providing knowledge about the FFA, placing less emphasis on farming, and relating FFA experiences with getting a good job explained the motivating factors for students who would consider joining the FFA.

As a means of promoting the FFA mission, the National FFA Organization encourages cooperation and cooperative attitudes among all people, and seeks to encourage its members to excel in the classroom through encouraging excellence in scholarship (National FFA Organization, 2000, p.98). Lockaby (1998) concluded that within the agricultural education model, the FFA is the most appropriate tool for teaching values and attitudes to agricultural education students. Turner and Herren (1997) compared FFA members with non-members in agricultural education. They found that FFA members had a higher need for achievement, affiliation, and power when compared to agricultural education students who did not join the National FFA Organization.

The National FFA Organization has an extensive awards program designed to encourage member growth in leadership, skill development, and responsibility. The FFA provides young people the opportunity to do something worthwhile, to excel in what they do, to receive appreciation for what they do, to be given responsibility, and to learn to be self-sufficient (Phipps & Osborne, 1988). Keith (1998) revealed that the type of competition that youth organizations offer is beneficial to the student as well as their families. Furthermore, agricultural educators are encouraged to link FFA leadership activities, award programs, and competitive events to high quality agricultural education curriculum (Guide to Local Program Success, 1998).

Purpose/Objectives

Although previous studies have explored why students enroll in agricultural education classes and why they join the FFA, little has been published in the literature about how involved students are once they join the FFA. The purpose of this study was to determine the degree of engagement of agricultural education students in the FFA, their agricultural education courses, their high school courses, and agriculture. A secondary purpose was to further explore why students enroll in agricultural education and why they join the FFA. Specific objectives were:

1. Determine influencers for students to enroll in agricultural education classes and to join or not join the FFA.
2. Compare FFA members and non-members on demographic characteristics and on their ratings of the importance of high school courses and attitudes toward agriculture classes.
3. Describe involvement by FFA members in the areas of Award received, Office held, Degree obtained, Career Development Events, Leadership activities, and Proficiency awards.

Methodology

This was a descriptive, comparative study; therefore, self-administered mailed questionnaires were utilized to obtain data for analysis. Two similar questionnaires, developed by the researchers, were used for the samples of FFA members and non-members. Face and content validity were established using input from agricultural education professionals at Purdue University and the National FFA Center in Indianapolis, Indiana. Both questionnaires were pilot tested in an agricultural education class that was not a part of the study. The researchers made modifications to wording for clarity and understanding based on feedback from the pilot test.

The data were analyzed using SPSS for Windows. Descriptive statistics used included mean, standard deviation, frequency, range, and percentage. Crosstabs analysis using Chi-Square was used to determine statistically significant differences for FFA members and non-members on all nominal variables. Multivariate ANOVA was used to determine statistically significant differences for FFA members and non-members on all interval variables. A significance level of .05 was set a priori.

The FFA member questionnaire mailing consisted of an eight-page letter-sized booklet, a cover letter signed by 1998-99 National FFA President Lisa Ahrens and the two researchers, and a self-addressed postage-paid return envelope. The mailing to FFA members began in November of 1999. A stratified random sample of 125 FFA members from each of the four regions of the National FFA Organization to include members in rural, suburban and urban FFA chapters was identified to ensure proportional representation. The population was the 451,997 FFA members in the National FFA Organization in 1999. The sampling frame was the mailing list for the FFA New Horizons Magazine. The sample size of 500 was chosen to allow for an appropriate useable return rate after accounting for non-deliverable mailings and non-FFA recipients of the magazine who were a part of the database.

Procedures as specified by the University Human Subjects Office for anonymity and confidentiality of research subjects were followed. The Dillman method (Dillman, 1978; Salant & Dillman, 1994) for enhancing mailed questionnaire response rate was followed. Follow-up reminders and additional questionnaires were mailed at two-week intervals. In January 2000 data collection was to have stopped according to the Dillman method; however, the response rate was less than 50%. Therefore, an additional packet containing a cover letter, another questionnaire, a postage-paid return envelope, and a small gift was mailed to all non-respondents. Two weeks later a final response request was mailed out to all remaining non-respondents. The FFA member portion of the study had a useable response rate of 52%. Of the 500 questionnaires mailed out 221 useable responses were received, 71 were classified as unusable responses, and 208 as non-respondents. Because of the low response rate after three mailings (39%), the responses were divided into early (those who responded to the initial data collection mailings, n=119) and late (those who responded to the additional data collection mailing, n=56) (Miller & Smith, 1983). ANOVA or Chi-Square was conducted on key questions to determine if any statistical differences existed between early and late respondents. Of the 13 selected variables for comparison, only two were statistically significant at the .05 level.

The non-member questionnaire also consisted of an eight-page letter-sized booklet. Because no sampling frame existed for agricultural education students nationwide, cluster sampling using the secondary agricultural education program as the unit was used. A cluster sample of 40 secondary agricultural education programs, stratified by region, was randomly selected to receive 12 or 13 questionnaires each to be administered to agricultural education students in their classes who were not FFA members. The sampling frame of the Agricultural

Education programs was obtained from the National FFA Organization's database of FFA advisors/agricultural educators. This resulted in a sample size of 500 non-members.

Procedures as specified by the University Human Subjects Office for anonymity and confidentiality of research subjects were followed. The Dillman method (Dillman, 1978; Salant & Dillman, 1994) for enhancing mailed questionnaire response rate was followed. The return label on the reply envelope was coded to facilitate follow-up mailings. On October 29, 1999 a packet containing a cover letter signed by 1998-99 National FFA President Lisa Ahrens and the two researchers; 12 or 13 questionnaires, and a self-addressed, postage-paid return envelope was mailed to the 40 agricultural education programs. Two weeks after the initial mailing a letter was mailed to each teacher of a non-respondent program asking them to complete and return the questionnaires. During the week of January 4, 2000 the researchers telephoned all remaining non-respondents. Telephone follow-ups, with additional packets mailed in some cases, continued from January 4, 2000 through April 28, 2000. The non-member portion of the study had a useable response rate of 63%. Of the 500 in the sample 220 useable responses were received, 150 were classified as unusable responses, and 130 were non-respondents.

Findings

All four of the demographic variables showed statistically significant differences between FFA members and non-members (See Table 1). Two-thirds of FFA members reported they had

Table 1

Demographic Characteristics of FFA Members and Non-Members

Category	Response	FFA Members		Non-Members	
Parents/Siblings inAgEd/FFA/4-H*		n	%	n	%
	Yes	150	68.5	63	29.6
	No	69	31.5	150	70.4
Live on[a]*					
	Farm	67	30.6	29	13.4
	Rural	117	53.4	132	61.1
	Urban	31	14.2	38	17.6
	City	4	1.8	17	7.9
4-H Member*					
	Yes, current member	39	18.0	9	4.2
	No, former member	67	30.9	43	20.2
	No	111	51.2	161	75.6
Have an SAE*					
	Yes	134	66.3	75	38.5
	No	68	33.7	120	61.5

[a] Urban = area with subdivisions, stoplights, lots of stores. City = area with little open space except for parks, shopping malls, is one of most populated areas of the state.

* Statistically significant at the $p<.05$ set a priori

a parent and/or sibling who had been in agricultural education, FFA, or 4-H whereas less than one-third of non-members reported a family member with previous agricultural education or 4-H experience. A greater percentage of FFA members reported they lived on a farm, whereas a greater percentage of non-members reported living in a city. Almost one-half of FFA members were current or former 4-H members, whereas almost one-fourth of non-members were current or former 4-H members. Two-thirds of FFA members and two-fifths of non-members reported they currently had a Supervised Agricultural Experience (SAE).

FFA members and non-members were asked to rate the importance of their high school courses (See Table 2). There were no statistically significant differences between the two groups for 14 of the 17 listed courses. FFA members had a statistically significant higher mean than non-members for agricultural education and history/social studies. Non-members had a statistically significant higher mean than FFA members for health/sex education.

Table 2

Ratings of the Importance of High School Courses by FFA Members and Non-Members

Category	FFA Members			Non-Members		
	n	mean[a]	s.d.	n	mean[a]	s.d.
Math	210	3.25	.90	205	3.18	.94
Computers	209	3.06	.89	204	3.07	.98
English	209	3.08	.88	205	2.93	1.01
Business	207	2.99	.85	205	2.95	.85
Agric. Ed.*	210	3.02	.92	205	2.48	.91
Science	210	2.96	.93	205	2.76	.99
Vocational	209	2.90	.98	204	2.73	1.01
History/Social Studies*	210	2.71	.98	205	2.48	.93
Religion	210	2.67	1.13	204	2.54	1.18
Government	210	2.56	.97	205	2.53	.91
Phys. Ed.	209	2.60	1.01	205	2.48	1.03
Family and Consumer Sci.	210	2.46	.99	205	2.57	.97
Health/Sex Ed. *	210	2.46	1.07	205	2.74	1.01
Foreign Languages	210	2.28	.98	205	2.31	1.07
Music	209	1.94	1.02	205	2.13	1.02
Drama	210	1.76	.98	205	1.69	.87
Art	209	1.86	.95	205	2.04	1.02

[a] 1=Not Important, 2=Somewhat Important, 3=Important, 4=Very Important

* Statistically significant at the $p<.05$ set a priori

FFA members and non-members were asked their attitudes regarding their agricultural education classes (See Table 3). FFA members had statistically significant higher means than non-members for all five questions. FFA members were in greater agreement than non-members that their agriculture classes were preparing them for the future, challenging, interesting, exciting, and accepting of open discussion. Non-members disagreed that their agriculture classes were challenging.

Table 3

Attitudes Toward Their Agriculture Classes by FFA Members and Non-Members

Category	FFA Members			Non-Members		
	n	**mean[a]**	**s.d.**	**n**	**mean[a]**	**s.d.**
My ag. classes are preparing me for the future*	210	3.15	.70	208	2.58	.89
My ag. classes are challenging*	210	2.72	.78	208	2.30	.78
My ag. classes are interesting*	210	3.27	.72	207	2.93	.77
My ag. classes are exciting*	210	3.20	.77	208	2.66	.87
My ag. classes allow for open discussion*	209	3.21	.75	207	2.80	.86

[a] 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree

* Statistically significant at the p<.05 set a priori

FFA members and non-members were asked through an open-ended question "What or who influenced you to enroll in agricultural education classes" (See Table 4). There were no statistically significant differences between the two groups for any of the categories. Both groups had the greatest percentage of respondents answer that "Self" was the reason for enrolling. The category of "Other" included responses such as "guidance counselor placed me in the class," "no other class fit my schedule," and "a teacher other than my agriculture teacher."

Table 4

Influencers to Enroll in Agricultural Education Classes by FFA Members and Non-Members

Category [a]	FFA Members		Non-Members	
	n	**%**	**n**	**%**
Self	83	40.3	90	46.6
Ag. Teacher	36	17.5	20	10.4
Friends	26	12.6	23	11.9
Parents	20	9.7	19	9.8
Siblings	18	8.7	11	5.7
Other	17	8.3	26	13.5
Other family	6	2.9	4	2.1

[a] Self-reported and converted by the researchers to categories.

* Statistically significant at the p<.05 set a priori

FFA members were asked through an open-ended question "What or who influenced you to join the FFA" (See Table 5). The top four responses from highest percentage to lowest were "agriculture teacher," "self," "parents," and "siblings." The category of "Other" included responses such as "friend's father," "other FFA members," and "a teacher other than my agriculture teacher."

Table 5

Influencers to Join FFA by FFA Members

Category [a]	FFA Members	
	n	%
Ag. Teacher	49	22.8
Self	38	17.7
Parents	34	15.8
Siblings	34	15.8
Friends	32	14.9
Other	19	8.8
Other family	9	4.2

[a] Self-reported and converted by the researchers to categories.

Non-members were asked through an open-ended question "I am not in FFA because" (See Table 6). Almost one-half of the respondents responded that "not interested in the FFA" was the reason for not joining. The next three responses from highest percentage to lowest were "not enough time," "don't know much about it," and "money." The category of "teacher" was identified by one respondent.

Table 6

Influencers Not to Join FFA by Non-Members

Category [a]	Non-Members	
	N	%
Not interested	100	49.0
Not enough time	64	31.4
Don't know much about it	22	10.8
Money	8	3.9
Don't see benefits	5	2.5
Wouldn't fit in	3	1.5
Don't have high enough grades	1	0.5
Teacher	1	0.5

[a] Self-reported and converted by the researchers to categories.

Non-members were asked to rate seven barriers on a scale of one to seven, with "1" being the greatest barrier, to enrolling in the FFA (See Table 7). One-fourth of the respondents ranked "takes too much time" as the greatest barrier to joining FFA. This response was also the greatest barrier identified when responses are ranked by mean from lowest to highest. "The purpose of FFA isn't attractive" and "FFA is not interesting" were the second and third greatest barriers. The barrier of "my agriculture teacher" received the lowest mean rating indicating students felt it was the least likely barrier to joining the FFA of any of the seven choices.

Table 7

Barriers to Joining the FFA by Non-Members

Category [a]	n	mean	s.d.	% Ranking #1
Takes too much time	179	2.98	1.68	25.1
The purpose of FFA isn't attractive	178	3.35	1.76	16.3
FFA is not interesting	178	3.56	1.78	17.4
It won't help me in the future	179	3.97	1.87	11.2
Costs too much money	179	4.23	2.03	13.4
Transportation	179	4.34	1.96	12.3
My agriculture teacher	179	5.53	1.84	5.0

[a] Respondents ranked seven items as 1-7 with 1 being the greatest barrier.

FFA members were asked to indicate their highest level of involvement for several FFA activities (See Table 8). About one in three respondents identified Star Greenhand or Star Chapter FFA as their highest award. Another one in three stated they had not received any award in the FFA. A little less than one-half of the respondents identified the Greenhand degree as their highest degree. About one-half of the respondents selected Committee Member as their highest office. Another two-fifths responded that Chapter Officer was their highest office. The question "My highest level on a Career Development Event (CDE) team or judging team is ____" was asked of FFA members. Approximately two-fifths responded they never participated in a CDE. Approximately 46% had participated in a CDE above the chapter level. The question "The highest level I've participated in a Leadership event such as public speaking or demonstrations is ___" was asked of FFA members. One-half responded they never participated in a leadership event as defined by this question. Approximately one-third had participated in a leadership event above the chapter level. The question "The highest level I have submitted a proficiency award is ____" was asked of FFA members. Almost two-thirds responded they had never submitted a proficiency award application.

Conclusions, Implications, and Recommendations

FFA members more than non-members had a higher percentage that were current or former 4-H members, a higher percentage that had parents or siblings who were in agricultural education or 4-H, and a higher percentage self-reported that they lived on a farm. A higher percentage of FFA members than non-members reported that they had an SAE. This supports the findings of Connors, Moore, and Elliot (1990) that agricultural education students join the FFA because of an interest in agriculture.

Implications are that FFA members are more connected to agriculture and that the core of traditional agriculture students continues to gain benefits from the FFA and its activities. It is recommended that efforts to diversify FFA membership to students outside of traditional agriculture demographics be continued. In the effort to broaden the scope of FFA programs and services; however, it is further recommended that traditional aspects of FFA not be de-emphasized to the detriment of these core traditional agriculture students.

Table 8

FFA Involvement by FFA Members

Category	Response	n	%
Highest Award			
	STAR Greenhand or Chapter FFA	46	29.9
	None	45	29.2
	Others (top fruit sales, etc.)	26	16.9
	Proficiency	24	15.6
	Individual	10	6.5
	Team	3	1.9
Highest Degree			
	Greenhand	82	46.6
	Chapter	58	33.0
	State	27	15.3
	American	9	5.1
Highest Office			
	Committee member	89	48.6
	Committee chair	15	8.2
	Chapter officer	68	37.2
	District officer	6	3.3
	State officer	5	2.7
Highest CDE Participation			
	Never participated in CDE	97	44.9
	Chapter CDE	19	8.8
	District CDE	45	20.8
	State CDE	40	18.5
	National CDE	15	6.9
Highest Leadership Event			
	Never participated in leadership event	109	50.2
	Chapter leadership	33	15.2
	District leadership	44	20.3
	State leadership	29	13.4
	National leadership	2	0.9
Highest Proficiency Award			
	Never submitted proficiency	137	64.9
	Chapter proficiency	34	16.1
	District proficiency	20	9.5
	State proficiency	14	6.6
	National proficiency	6	2.8

FFA members more than non-members believe that their agriculture classes are preparing them for the future, are challenging, interesting, exciting, and allow for open discussion. This supports the findings of Marshall, Herring, and Briers (1992) that students enroll because of characteristics of the class. FFA members and non-members rated the importance of high school courses mostly the same. FFA members rated Health/Sex Education of less importance and Agricultural Education and History/Social Studies of higher importance than did non-members.

The implication from this study is that students who are FFA members see greater value in their agricultural education classes; therefore, they are more engaged in their agricultural education classes as evidenced by their participation in activities through membership in the National FFA Organization. It is recommended that methods be identified to convince non-members of the value of their agricultural education classes, so they will find those classes more challenging, interesting, exciting, and of more importance as well. Without joining the debate on whether 100% FFA membership and 100% SAE participation for all agricultural education students should be a requirement for enrollment in agricultural education classes, it is recommended that all agricultural education students be counted and treated as local FFA members and all agricultural education students receive instruction in career exploration and on career opportunities.

Both FFA members and non-members reported that reasons internal to themselves were the greatest influencer for enrolling in agricultural education classes. This finding is new to the literature base. FFA members more than non-members were influenced to enroll because of the agriculture teacher. Non-members were more influenced to enroll by other factors beyond their control such as guidance putting them in the class and the agriculture class being the only class that would fit their schedule. The agriculture teacher was the greatest influence on students joining the FFA. Non-members reported that their three greatest barriers to joining FFA were they were not interested, did not have enough time, and did not know much about the FFA. When asked to rank stated barriers, the three identified as the greatest were FFA takes too much time, the purpose of FFA is not attractive to me, and FFA is not interesting. These last findings support the work by Gliem and Gliem (2000).

The implication is that it will be extremely difficult to persuade someone to join FFA if they are not interested. Additionally, students may be saying, "I don't have enough time" as another way of stating they are not interested. The response of "self" as a reason for enrolling needs to be explored further as the researchers do not know whether the respondents meant no one influenced them, or even though someone might have influenced them they made the decision themselves, or something else altogether.

The implication from non-members is that they are not in agricultural education classes because of agriculture or a desire to learn about agriculture, but because of other factors (guidance, like the agriculture teacher, only class that would fit schedule, etc.). A question that needs to be asked is "Should students who fit this profile be expected to join FFA to its fullest extent?" It is recommended that further research be conducted to identify levels of interest or motivations for students in agricultural education classes. It is recommended that emphasis for involvement at the local level be the force for connecting non-members to the agricultural education model. Most students will never see National Convention or Washington, DC. However, local plant sales, landscaping a town's nursing home, or cleaning up a local waterway could influence many agricultural education students who are not joining FFA to reconsider the benefits of membership including career exploration and personal development opportunities.

A little less than one-third of the FFA members reported that they had not received any award in FFA and almost one-half checked that their highest office was that of committee member (which was the lowest level of participation listed for that question in the survey). Two-fifths had never participated in a CDE, one-half had never participated in a leadership event, and two-thirds had never completed a proficiency award application. One-third did not have an SAE at the time of the survey.

The implication is that involvement of a greater percentage of the general membership in FFA activities could persuade agricultural education students who are not FFA members to become involved. A recommendation is that agriculture teachers should actively involve a greater percentage of their current membership. This will spread the benefits of FFA involvement to more members and may help in recruiting agricultural education students who are not FFA members to join. In order to allow involvement of more students, it is recommended that the National FFA Organization explore the feasibility of an awards program to recognize FFA chapters engaging the greatest percentage of agricultural education students in FFA activities to include all levels (local, state, national).

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Finding And Keeping Members: Perspectives Of FFA Members And Non-Members On The Effectiveness Of FFA Programs And Services

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ABSTRACT

The purpose of the study is to determine if there is a difference between FFA members and non-members as to their perception of FFA programs and services, and to determine if students' perceptions of FFA programs and services are influenced by gender and ethnicity, enrollment choice, prior enrollment in an agriculture class, block scheduling, grade level and extracurricular activities.

Data were collected using a questionnaire administered to 404 students enrolled in the Agriscience Applications course in 27 schools in North Carolina. It can be concluded that: A student's decision to join or not join the FFA is influenced by their perception of FFA programs and services. A student's gender, ethnicity, enrollment choice, prior enrollment in an agriculture class, block scheduling, grade level and extracurricular activities do not influence their perceptions of the FFA programs and services.

The implications are significant for the FFA and agricultural education in that students tend to join and participate in the FFA based upon the organization's ability to meet a student's need for a sense of belonging. The FFA should continue to seek ways to involve all members in positive personal growth activities that allow students to experience that sense of belonging. Based upon the responses of members, the social aspects of the organization were motivating factors in their desire to be members.

INTRODUCTION

Does the FFA provide relevant programs and services to its members? In a review of selected FFA programs, it was noted that member participation had declined in North Carolina in selected career development events, scholarship programs, Agriscience student awards, and other individual award areas (North Carolina FFA Association, 1998). Because many FFA activities require student participation at the local level before advancing to state and national levels, this decline in state level participation may be indicative of less involvement by students in FFA activities at the local level.

The National FFA Organization and similar organizations in other states should consider membership numbers to be a potential predictor of a student's perception of the relevance of the organization (Sirkin and McDermott, 1995). If this is true, then the FFA must make substantial programmatic changes in order to more effectively satisfy students' interests and needs. One potential objection that may be offered by non-members is that FFA programs and services are not worth the financial investment one has to make in order to be an FFA member. Sirkin and McDermott (1995) contend that members will desire to maintain their membership in an organization if they perceive that it is worth at least the value of membership dues.

Although some non-members might offer the argument that they cannot afford the cost of FFA dues, it is important to note that FFA membership dues on the state and national levels have not significantly increased. From 1928 to 1969, the total cost for national FFA dues increased from ten cents per member to 50 cents per member. From 1969 to 1989, national FFA dues increased from 50 cents per member to $3.00 per member. State FFA dues have increased in a similar fashion. From 1984 to 1995, state FFA member dues increased from $2.50 per member to $4.50 per member. In 1999, state and national dues were $4.50 and $5.00 respectively (North Carolina FFA Association, 1998). For these dues, an FFA member can expect to receive the official magazine of the National FFA Organization, The FFA New Horizons Magazine, an official membership card, eligibility to apply for FFA scholarships, eligibility to participate in FFA career development events, individual member awards programs and other local FFA activities and programs.

THEORETICAL FRAMEWORK

Maslow introduced the concept of self-actualization in his book, Motivation and Personality. Maslow believed that the human individual is an integrated organism. It is impossible to separate the various components of a person's self. When an individual experiences hunger, it is their whole self that is hungry and not just selected physiological components. It is the whole person that has the desire for food, shelter and safety.

Until the basic physiological needs are met, the human is motivated to satisfy these needs. Once basic physiological needs are met, a different set of needs become evident. Maslow referred to these as the safety needs and characterized them as stability, security, and protection from harmful external conditions. If both the physiological and safety needs are met, then love and affection needs emerge. Maslow categorized these needs as the need for contact and intimacy.

The next level of need is identified by Maslow as the esteem needs. These needs are characterized by a person's desire for status, fame, dominance, and importance. These needs will lead the individual to feel self-confident, worthy and useful in their environment. Individuals deficient in this need will experience feelings of helplessness and weakness.

At the top of the hierarchy is self-actualization. Even if all of the other needs are met, the individual will develop a sense of restlessness and discontentment unless he or she is accomplishing goals true to oneself (Maslow, 1970).

The various levels of the hierarchy are ordered such that almost everyone proceeds instinctively through them in the same order. Maslow's original hierarchy has been adjusted to include two additional tiers between the esteem needs and self-actualization. Resting upon esteem needs are cognitive needs characterized by a person's search for knowledge and understanding. If these needs are met, the individual progresses to aesthetic needs that are identified as a person's desire for order and beauty. (Weiten, 1989). Maslow suggested that an individual progresses through this hierarchy in the order described. However, the order may be rearranged as a result of an individual's experiences. By suggesting this, Maslow recognized the biological and social bases of human motivation (Weiten, 1989). Maslow's Hierarchy of Needs has proven to be influential in the discussion of human motivation.

Maslow's Hierarchy is relevant to this study in that it offers a basis for understanding potential reasons why students join and participate in youth organizations, namely the FFA organization. If students are motivated by self-esteem, a sense of belonging, a desire for status, and a need to feel important, then this theory may explain why students tend to join and participate in the FFA organization.

In addition to Maslow's Theory, the Expectancy-Value Theory conceptualizes the motive behind a student's decision to participate in FFA activities. FFA programs and services are directed toward helping students achieve their goals. For achievers, FFA activities should be challenging and maintain a high level of interest without being unattainable. For students motivated by a need to avoid failure, FFA activities should be provided at multiple difficulty levels so students do not become discouraged (McClelland, 1955).

The Effectiveness of FFA Programs in Meeting Students' Needs

Weatherford (1984) reported that students perceived a higher need for safety, legitimacy and self-worth, a higher sense of identity, and a stronger need to participate in society than was perceived by their respective vocation student organization advisors.

\Shinn and Vaughn (1993) found that the national FFA organization should develop new career development events based upon emerging student interests and agricultural technologies. Furthermore, recognition programs should be periodically reviewed to determine their effectiveness in motivating students and the FFA should continue its efforts to promote ethnic and gender diversity in its membership. Finally, the study found that the national FFA organization should develop strategies for encouraging participation at all levels of the organization: local, state and national.

Wingenbach and Kahler (1997) found that a positive relationship existed between a student's perception of his or her leadership and life-skill ability and participation in FFA leadership activities. In addition, Turner and Herren (1997) concluded that agricultural education students who join the FFA had a higher need for achievement, affiliation and power than did non-members. Furthermore, African American students had a higher need for power, achievement and affiliation than Caucasians and others. Female agricultural education students had higher needs for affiliation and power than their male counterparts.

Rossetti, McCaslin, and Gliem (1996) examined the factors influencing students' decisions on whether to become FFA members. Students who were members of the FFA reported that assistance in achieving future career goals and other goals, interest in FFA activities and programs and the enjoyment derived from them, and leadership skill development were major reasons for being a member. Non-FFA members responded in the study by saying that they did not have enough time for FFA activities and having more important things to do as major reasons for not joining the FFA.

One major reform initiated in North Carolina in recent years is the implementation of block scheduling in high schools. Becton (1996) investigated the impact of block scheduling on FFA programs and activities and found that teachers believe that block scheduling has a deleterious effect on FFA member recruitment and retention. Furthermore, block scheduling was perceived to have little impact on classroom instruction or supervised agricultural experience. Communication between teachers and students not currently enrolled in agriculture classes was identified as a major problem. Wortman (1997) found that students who did not serve in official leadership positions in the local FFA chapter had no significant positive or negative perception regarding block scheduling and its impact on FFA activities. Students who served as FFA officers reported that block scheduling negatively influenced student participation in FFA activities.

Diversity Issues and FFA Membership

The traditional method of delivery for FFA programs may influence the non-traditional student's decision to participate in these programs. Sutphin, Newsom-Stewart (1995) found that males were influenced to enroll by peer pressure more than females, and were more apt to study agriculture in order to escape academic courses. Females were more inclined to enroll for the purpose of developing team and life skills (Sutphin, Newsom-Stewart, 1995).

Garton, Thompson and Cano (1997) found that a majority of students preferred introversion, sensing, feeling and judgment learning preferences. Conversely, teachers preferred active learning as evidenced by extroversion, intuitive, thinking and judgment learning preferences. They concluded that while teachers focus on achievement and competition, many students tend to avoid competition. Teachers who use FFA competitive events as a recruitment and retention strategy may need to proceed with caution. The structure of FFA competition is such that students may be discouraged from joining the FFA.

PURPOSE OF THE STUDY

The purpose of the study is to determine the factors influencing a student's decision to join or not join the FFA. The specific research questions are:

1. Is there a difference between FFA members and non-members as to their perceptions of the effectiveness of FFA programs and services to meet an individuals needs for premier leadership, personal growth and career success?

2. Are students' perceptions of FFA programs and services influenced by gender, ethnicity and FFA membership status?

3. Are students' perceptions of FFA programs and services influenced by enrollment choice, prior enrollment in an agriculture class and FFA membership status?

4. Are students' perceptions of FFA programs and services influenced by block scheduling and FFA membership status?

5. Is there a relationship between a student's grade level and their perceptions of the value of FFA programs and services?

6. Is there a relationship between the number of clubs and formal athletic activities in which a student participates and their perceptions of FFA programs and services?

RESEARCH METHOD

The population for this study is first year students of agricultural education who were enrolled in the Agriscience Applications course in North Carolina schools. Four hundred and four students were selected for the study based upon the geographic region in which their school is located. Schools selected for this study all had FFA chapters and were categorized as having 33% or less FFA membership, 34-66% membership, or 67-99% membership.

Because this was descriptive research, a questionnaire was developed based upon a series of FFA program characteristics. Participants were asked to respond by indicating their agreement with a series of 18 statements regarding the image of the FFA. The response choices and their numerical values are as follows: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1, and Do Not Know = 0. The midpoint of this scale was 2.5, and all mean scores above this number were interpreted be in agreement with the item. All mean scores below 2.5 were considered to be in disagreement with the item and items with a mean score of 2.5 were interpreted to represent a neutral opinion.

The scaled items were derived from the objectives of the FFA Local Program Success Model (National FFA Organization, 1997a). The Local Program Success Model was created and developed by experts in agricultural education for the purpose of improving local agricultural education programs. The researcher's graduate advisory committee, as a panel of experts in agricultural education and FFA, identified additional items to be included in the survey instrument and modified some items derived from the Local Program Success Model. The instrument was field tested and yielded a Cronbach's Alpha score of 0.88.

The data were collected and tabulated using Microsoft Excel® and transferred to the Statistical Package for Social Sciences (SPSS) 8.0 for Windows®. The first procedure involved an analysis of descriptive statistics in order to have a clear profile of the sample. Descriptive statistics were generated for gender, ethnicity, grade level, prior enrollment, enrollment choice, block schedule characteristics of the school, FFA membership status, and number of clubs in which survey respondents held membership.

The next procedure involved an analysis of the first research question. A multivariate analysis was used to examine the 18 items simultaneously and if differences were determined to exist between FFA member and non-member perceptions, one-way analyses of variance determined which items accounted for the overall differences.

Prior to any multivariate analyses, the dependent variables were compared using the Pearson Product Moment Correlation statistic to determine if a significant correlation existed between the scaled items on the survey instrument. Hotelling's Trace was the method for determining the level of significance in each multivariate analysis. The next procedure involved a multivariate analysis of variance test to determine if students' perceptions of FFA programs and services were influenced by selected demographic and school characteristics as described in research questions two through four. For those multivariate analyses that yielded significant differences in the main effects of independent variables, a one-way analysis of variance was performed to pinpoint any significant differences.

In addition, the Pearson Product Moment Correlation statistic was used to answer research question five by determining if a relationship existed between the grade level of students and the students' perception of FFA programs and services and question six by determining if a relationship existed between the number of clubs in which students were members and their perceptions of FFA programs and services.

FINDINGS

The majority of study participants were males, constituting 76 % of the data sample. In all, there were 308 males and 96 females in the data sample. Females comprised 22.6 % of the members and 24.5 % of the non-members in the study. Of all participants in the study, 41.5 % indicated that they were FFA members and 58.5 % were non-members. Two hundred ninety nine Caucasian students and 102 non-Caucasian students participated in the study. To ensure the confidentiality of students responses, all ethnic groups except Caucasian were combined for data analysis.

Freshmen made up 51.7 % of the students in the survey while seniors were the fewest number of students in the sample, comprising only 5.7 % of the sample. With respect to club participation, 34% of respondents indicated that they were not members of any club or school organization and did not participate in any kind of extracurricular activity. This constituted the largest number of responses in the sample. More FFA members participated in clubs and athletic activities than non-members.

Participants in the study were also asked to provide data regarding their choices in signing up for Agriscience Applications. The majority of students reported that they signed up for the class by their own free will and that this was their first agriculture class. Eighty nine percent of the students in this study report that their school is on a block schedule system.

Perceptions of FFA Members and Non-members Toward FFA Programs and Services.

A multivariate analysis was performed using as the dependent variables the items on the instrument designed to measure students' opinions of FFA programs and services. The independent variable was FFA membership status. This analysis yielded a Hotelling's Trace value of 0.210 ($p<.05$). Therefore, a significant difference exists between FFA members and non-members with regard to their opinions of FFA programs and services.

Tables 1 and 2 show the responses of members and non-members with respect to their opinion of the effectiveness of FFA programs and services in meeting their needs for leadership, personal growth and career success. Most FFA members in the study agreed with the concept that the FFA teaches necessary leadership skills, producing a mean score of 3.18 ($SD = 0.51$) for this item on the instrument. FFA members agreed in their opinions as to the effectiveness of the FFA in teaching communication skills, although the mean score for this item was slightly less at 3.15 ($SD = 0.60$). Furthermore, the majority of FFA members agreed with the idea that traditional FFA leadership topics such and parliamentary procedure and public speaking are interesting, producing a mean score for this item of 2.73 ($SD= 0.81$). Non-members rated leadership topics such as parliamentary procedure and public speaking lowest among this series of items ($M=2.5$, $SD=0.84$). The most favorable response from the non-members was in the

Table 1

Perceptions of Members and Non-Members Regarding FFA Leadership, Personal Development and Career Development Programs.

Survey Instrument Items	Members (n=168)		Non-Members (n=236)		F
	Mean	Std. Dev.	Mean	Std. Dev.	
The FFA provides help in choosing a career.	3.25	0.52	2.98	0.64	17.41*
The FFA teaches leadership skills necessary for success in life.	3.18	0.51	2.89	0.74	16.13*
The FFA helps people with their educational goals.	3.17	0.58	2.93	0.71	11.18*
The FFA offers students with a great opportunity to travel.	3.16	0.59	2.84	0.76	16.78*
FFA activities help students learn to communicate better.	3.15	0.60	2.90	0.67	11.63*
The FFA helps students be more self-confident.	3.13	0.58	2.96	0.71	5.34*
FFA activities help students made better decisions regarding school and work.	3.10	0.67	2.90	0.68	6.47*
FFA members get a lot of attention when they win awards.	3.00	0.68	2.66	0.77	16.38*
The FFA encourages students to get a job in the agriculture industry.	2.97	0.68	2.90	0.67	0.95
FFA activities help students improve their grades.	2.92	0.77	2.62	0.73	11.18*
The FFA leadership topics like parliamentary procedure and public speaking are interesting.	2.73	0.81	2.50	0.84	5.63*

*p<.05.1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree

Table 2

Perceptions of Members and Non-Members of Overall Programs and Services.

FFA Personal Development Items	Members (n=167)		Non-Members (n=236)		F
	Mean	Std. Dev.	Mean	Std. Dev.	
FFA activities seem to be well organized and publicized.	3.03	0.73	2.80	0.80	6.95*
FFA activities such as contests are too complicated for me.	2.96	0.82	3.14	2.67	.058
FFA activities are held at a convenient time and location for me to attend.	2.72	0.73	2.51	0.81	5.15*

*p<.05. 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree

FFA organization's ability to help students learn communication skills (M=2.90, SD=0.67). Table 1 reports the responses of students to the FFA programs and services items related to leadership development, Personal Development and Career Development Programs.

The FFA members in the study rated the ability of the FFA to help people with their educational goals highly (M=3.17, SD=0.58). The FFA members reported that FFA programs offer a great opportunity for travel (M=3.16, SD=0.59). For the majority of members, FFA programs build self-confidence (M=3.13, SD=0.58) and recognize members for their achievements (M=3.00, SD=0.68). Finally, members agreed with the idea that the FFA helps students improve their grades in school (M=2.92, SD=0.77).

Non-members in the study reported a significantly lower opinion of the FFA's ability to help students with their educational goals (M=2.93, SD=0.71), and with the concept that FFA can help students improve their grades in school (M=2.62, SD=0.73). Furthermore, non-members in the study reported significantly lower opinions of the FFA organization's ability to offer important personal growth opportunities through its travel (M=2.84, SD=0.76) and award programs (M=2.66, SD=0.77).

The FFA members in the study agreed with the idea that the FFA does indeed help students make career choices (M=3.25, SD=0.52). Furthermore, FFA members in the study reported that the FFA helps students to made better decisions whether it involves school or career choice (M=3.10, SD=0.67). Although their scores indicated agreement with the members, non-members in the study provided significantly lower mean scores in their opinion that the FFA helps students make better academic and career choices (M=2.90, SD=0.68).

Table 2 shows the responses of members and non-members regarding their opinions of FFA programs overall. FFA member's opinions did not rank very highly in this particular section when compared to their scores on previous items. The FFA members agreed that FFA activities were held at a convenient time and location(M=2.72, SD=0.73) and that these activities were adequately publicized (M=3.03, SD=0.73). The non-members in the study held significantly lower opinions of the idea that FFA activities are held at a convenient time and location (M=2.51, SD=0.81) and were well publicized (M=2.80, SD=0.80). Based upon the analyses performed to address the second research question, this research shows that significant differences do exist between the perceptions of FFA members and non-members as to their opinions of FFA programs and services.

Students' Perceptions of FFA Programs and Services as Influenced by Selected School and Demographic Factors

There were no significant differences identified in the interaction effects between FFA membership status, gender and ethnicity. The results of the analysis did once again indicate a significant difference between the mean scores of FFA members and non-members. FFA membership status and prior enrollment and enrollment choice in an agriculture class had no significant effect the opinions of students. A school's block scheduling status did not significantly influence the respondents' opinion of the FFA programs and services. Furthermore, the interaction effect of FFA membership status and block scheduling did not yield significant differences.

A Pearson Product Moment Correlation Coefficient of 0.076 (p=.13) for the correlation between FFA organizational image and the respondent's grade level was generated. Based upon these results, there is not a significant relationship between the respondents' grade level and their opinions of FFA programs and services. Another Pearson Product Moment Correlation was computed to test the significance of the relationship between the respondents' level of participation in school organizations on their opinions of FFA programs and services. A correlation coefficient of 0.09 (p=.15) for FFA programs and services was generated. There was no significant relationship found between the respondents' level of participation in school organizations and their opinions of FFA programs and services.

CONCLUSIONS

Conclusion I: A student's decision to join or not join the FFA is influenced by their perceptions of the effectiveness of FFA programs and services in their school.

FFA programming makes a difference in a student's decision to join the FFA. In general, FFA members' responses to items related to the effectiveness of FFA programs and services were significantly more positive than the responses of non-members. However, it must be noted that non-members did perceive some FFA programs and services to be of value even though they chose not to become members.

Conclusion II: A student's gender and ethnicity do not influence their perceptions of FFA programs and services.

Students' responses to items on the questionnaire were not significantly influenced by gender and ethnicity. The FFA has developed numerous recruiting materials in recent years that not only represent the current ethnic and gender characteristics of the membership, but also portray what FFA membership could be if it were more diverse in ethnicity and gender.

Conclusion III: Voluntary enrollment in an agriculture class and prior enrollment in an agriculture class does not influence a student's perceptions of FFA programs and services.

This study did not find that student's enrollment choice or prior enrollment in an agriculture class made a significant difference in their decision to join or not join the FFA. Students who are involuntarily enrolled in an agricultural class may not necessarily be adverse to joining the FFA, just as students who voluntarily enroll in an agriculture class are not necessary motivated to join the FFA. This study did not find that prior enrollment in an agriculture class significantly influenced over a student's decision to join or not join the FFA. Even though a high number of students with prior enrollment experience were part of the study, this did not have a significant effect on the results.

Conclusion IV: Block scheduling does not influence a student's perceptions of FFA programs and services.

Once considered to be an obstacle in the planning and implementation of FFA activities (Becton, 1996), block scheduling did not influence students' decision to the extent that it either encourages or discourages membership. North Carolina schools have been utilizing block scheduling for a number of years, and perhaps FFA advisors have begun to effectively recruit and retain FFA members under the system. Because a low number of students were on a traditional schedule, it would be imprudent to generalize the results of the analysis of this research question to the entire population of students that were enrolled in Agriscience Applications in the spring of 1998.

Conclusion V: Grade level does not influence a student's perceptions of FFA programs and services.

This study did not find that grade level was a significant influence on the opinions of students regarding FFA programs and services.

Conclusion VI: The scope of participation in school clubs and formal athletic activities does not influence a student's perceptions of FFA programs and services.

The scope of participation in school clubs and organizations might be effective in characterizing the students who might join and participate in FFA activities, but it does not singularly affect a student's opinions of the FFA organization's image and FFA programs and services.

IMPLICATIONS AND RECOMMENDATIONS

The results of this study are supported in the literature by Maslow (1970) and McClelland (1955). At an age when most students are becoming eligible for FFA membership, they are also entering a period of human growth and development characterized by a need for contact, intimacy, a sense of belonging and achievement. The implications are significant for the FFA and agricultural education in that students tend to join and participate in the FFA based upon the organization's ability to meet a student's need for self-esteem. The FFA should continue to seek ways to involve all members in positive personal growth activities that allow students to experience that sense of belonging. Based upon the responses of members, the social aspects of the organization were motivating factors in their desire to be members. The FFA members in this study tended to believe that the FFA provides an equal opportunity for all students to participate in and benefit from its programs, and that many of their friends were members of the FFA. However, the students today are not necessarily interested in some of the traditions of the FFA.

Overall, FFA members believe that the FFA provides valuable assistance in helping students choose a career and also helps students achieve their educational goals. Many of the programs and services offered by the FFA are designed to encourage individuals to succeed. For students motivated by achievement, FFA activities are available that are challenging and can maintain a high level of interest without being unattainable. For those students that are motivated by a desire to avoid failure, the FFA provides programs and services with multiple difficulty levels so that students do not become discouraged. Although FFA members in the study tended to believe that the FFA has an overall positive image, they also tended to score FFA programs and services lower. As a result, the FFA might wish to commit resources to the development of new products and services that more closely parallel students' interests and needs.

Non-members generally held a lower opinion of FFA programs and services than FFA members. Perhaps the slow evolution of FFA career development events and other awards programs in North Carolina has caused the FFA to fall behind in technology, therefore driving away students who might otherwise be interested in becoming a member. The FFA organization may be able to recruit new members if they offer activities that meet and exceed the expectations of non-members. The FFA organization's educational programs could be revised to permit a closer relationship with instruction in the agricultural sciences. Learning activities could be packaged in a way that creates value beyond the cost of FFA membership dues.

The findings that emerged from this study led to certain recommendations pertaining to future research. Additional research is suggested in the area of FFA programs and services. An in-depth study into the various programs such as career development events, proficiency awards, and scholarships, would identify potential areas of weakness. Although FFA members indicated that FFA programs and services helped them reach their educational and career goals, additional research is needed to determine which programs are more effective.

To assist with recruitment and retention, additional research should be conducted into determining the most effective methods for planning and implementing FFA activities. These results might be particularly useful to teacher education responsible for preparing agriculture teachers for field service.

One general recommendation emerged from this study. It is recommended that the National FFA Organization create within its business structure a research and development division. The purpose of this new division would be to constantly evaluate the effectiveness of the FFA in achieving its mission and goals, and to provide research findings to state FFA associations and state agencies responsible for agricultural education programs. Regardless of the method employed by the National FFA Organization, it is essential that an ongoing evaluation process be in place and operational.

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Value of Adult Volunteer Leaders In The New Mexico 4-H Program

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ABSTRACT

Volunteers are an integral part of America's 4-H program. Funding sources, however, frequently require government and nonprofit organizations to not only justify budget requests, but to also hold them accountable for the expenditure of public dollars. The purpose of this study was to determine the dollar value of volunteer time contributed to the New Mexico 4-H program. A profile of adult volunteer leaders in the New Mexico 4-H program was developed by describing personal characteristics, types of volunteer activities (or roles) engaged in, the estimated amount of time devoted to these volunteer activities, monetary donations contributed and motivational factors for volunteering. The economic value of the typical adult volunteer leader's time was determined by calculating the average number of hours spent in one year by a volunteer and multiplying that number by the average hourly wage for nonagricultural workers ($14.30) as determined by the Independent Sector in 1999. Subjects in the study were sampled from New Mexico 4-H volunteers enrolled as leaders for at least four years as of May 1998. The profile of the typical New Mexico 4-H volunteer in this study was female, age 41-45, of Caucasian race who is married, working full time with an average family income of over $50,000 annually. Most leaders had been a 4-H project leader for about eight years. Volunteers spent an average of 369.5 hours per person annually for a contribution of $5,284 each.

INTRODUCTION/THEORETICAL FRAMEWORK

Volunteers are an integral part of society and progress. Throughout our history the individual and united volunteer actions of thousands of unnamed citizens have had an impact on American society including caring for the disabled, poor or infirmed, volunteer fire departments, cultural and civic programs such as museums and libraries and as political action committees and groups. Volunteerism is making a very needed transformation within its' institutions and programs in order to better meet the vital, relevant needs of society (Independent Sector, 1999; Ellis, 1986). Recent trends indicated that the number of volunteers in public and governmental agencies are increasing. The Independent Sector (1999) reports that 56% of all American households volunteered in 1998, a 13.7% increase since 1995. This represents more than 109 million volunteers over the age of 18.

Volunteers are used extensively in America's 4-H program. Enrollment records maintained by National 4-H Council in 1999 indicated that 534,294 volunteers donated their time and energy working with youth as volunteer leaders with local 4-H clubs and assisting with 4-H youth development programs that reached over six and half million youth ages 5 to 19. In a 1985 national landmark study (Steele, Finley, & Edgerton, 1989), the ratio of time spent by 4-H volunteers and 4-H agents was 59 to 1 for 4-H activities connected with volunteers. Seventy percent of 4-H agents surveyed felt that working with volunteers was their most important job responsibility.

Despite the increase in the number of individuals volunteering, a misconception exists that volunteers represent cheap labor and are used to replace or decrease professional staff. However, in light of budget reductions and restrictions, volunteers are needed to maintain adequate levels of service to clientele and to prevent the loss of professional staff. Brudney's (1990) research on volunteers in the public sector found that although volunteers are considered "unpaid staff," an effective volunteer program is not inexpensive to manage. Brudney recommended that the decision to use or not use volunteers in an organization should be based on the cost of the program as compared to the level and quality of services provided, as well as any other advantages to the sponsoring organization.

Funding sources frequently require government and nonprofit organizations to justify requests for monetary support in the budgeting process and hold them accountable for the expenditures of public dollars. Funders also expect a return on their investment. Assessing the economic value of volunteer time to the organization is one approach to determining a rate of return. Learning about volunteers, such as what motivates them, what activities they participate in, how much time they are contributing, and the economic value of that time can help institutions increase efficiency and effectiveness. Several researchers have sought to describe volunteers by social characteristics (Clark & Skelton, 1950; Denmark, 1971; Parrott, 1977; Culp, 1996), motivators (Henderson, 1981; Rohs, 1986; Rouse & Clawson, 1992; Culp, 1997; Fritz, 2000), and activities participated in (Clark & Skelton, 1950; Culp, 1996; Culp, 1997), but few have sought information relevant to economic benefits and contributions. If an agency or organization can obtain monetary estimates of the value of services provided to clients by volunteers, they can be weighed against the expenditures of the program and a measure of effectiveness can be determined (Brudney, 1990).

Research concerning 4-H Youth Development and volunteers has been conducted in several states (Clark & Skelton, 1950; Culp, 1997; Denmark, 1971; Fritz, 2000; Parrott, 1977; Sawyer, 1980; Steele, 1985). While the overall value of volunteer contributions has been documented as valuable to the 4-H program, the specific nature and extent of the support given by these "unpaid staff members" still remains unmeasured in New Mexico.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the dollar value of the volunteer time contributed to the New Mexico 4-H Program. A profile of adult volunteer leaders in the New Mexico 4-H Program was developed by describing personal characteristics, types of volunteer activities (or roles) engaged in, the estimated amount of time devoted to these volunteer activities, monetary donations contributed, motivational factors for volunteering, and volunteer's comments related to their roles. Specific research objectives for this study were:

1. To describe respondents according to number of years as a volunteer 4-H leader, type of 4-H leader, number of children in 4-H, previous membership in 4-H, gender,

ethnicity, marital status, employment status, occupation, age, educational background, family income, and place of residence.

2. To determine what activities adult volunteer leaders are involved with during a New Mexico 4-H program year.
3. To determine how much time adult volunteer leaders devote to the New Mexico 4-H Program.
4. To determine the amount of monetary donations adult volunteer leaders contribute to the New Mexico 4-H program over a year's time in the form of phone calls, mileage, and supplies furnished.
5. To determine what motivates adult leaders volunteer for the New Mexico 4-H program.
6. To determine the economic value (dollar value) of the typical adult volunteer leader's time spent in the New Mexico 4-H Program during a 4-H program year.
7. To qualitatively describe volunteer's comments related to their role as a 4-H volunteer.

METHODS/PROCEDURES

The study was descriptive in nature. A mail questionnaire was used. The population of the study was New Mexico Cooperative Extension Service adult volunteer leaders enrolled for at least four years in the 4-H program as of May 1998 (N = 1,134). Volunteers who had served for four years were utilized in this study to reduce the limitation of a volunteer's ability to recall time contributed. It was believed that volunteers who had experienced a role or activity more than once were more likely to provide a credible estimate of time spent. A random table of numbers was used to select 265 of the 1,134 New Mexico adult volunteer 4-H leaders (Krejcie & Morgan, 1970).

The instrument used was adapted to this study from a previous instrument (Sawyer, 1980). The instrument contained six sections, which addressed the seven stated objectives. Section one of the survey asked volunteers four write in or categorical questions that determined magnitude and type of leader involvement. Section two of the instrument asked volunteers to state reasons or motivation for volunteering with the New Mexico 4-H program. A checklist of thirteen items from the literature was provided, with an additional open ended "other" category to identify the top two reasons or motivations for volunteering with New Mexico 4-H. Section three used categorical questions for volunteers to estimate the dollar amount contributed to the 4-H program over the period of one 4-H program year from October to September. Four items were listed in reference to monetary contributions: phone calls (local), long distance or pay phone charges, milage, and supplies furnished. Section four identified program activities of volunteer leaders and asked them to specify how much time they spent on each of the activities each month over a one year period. This section was designed in a matrix form. The left side listed eleven program activities performed by 4-H volunteer leaders and an "other" category. Each month of the year was listed across the top. Section five of the survey contained open and closed categorical questions to gather demographic data on each volunteer. Section six provided opportunity to share thoughts and comments.

Content and face validity was assessed using a panel of experts in research/statistics, 4-H/youth development, volunteerism, and economics. Changes were made in the matrix to have volunteers list the amount of time spent using hourly categorical responses. Reliability was assessed using a test-retest procedure with 30 volunteer leaders in New Mexico that were not selected to participate in the original study. A minimum percent agreement of 70 was set *a priori*. No statements, questions or subcategories were deleted.

Data were collected in February through June, 1999 following Dillman's (1978) procedures for a mail questionnaire. Instruments were coded with an identification number to track and follow-up with non-respondents. Three mailings were conducted. Telephone interviews were conducted with a random sample of 20% of the non-respondents using the entire questionnaire as a guide. The data from the interviews were compared to data from mailed questionnaires. No differences were found to exist and the results were generalized to the target population (Miller & Smith, 1983). The final usable response rate was 74% (n = 187).

Descriptive statistics were used to summarize the data. Frequencies, percentages, measures of central tendency and variability were used to describe the data. The economic value of the average leader's time was determined by multiplying the median number of hours served per year by the hourly wage of $14.30 determined by the Independent Sector's 1999 hourly wage for nonagricultural workers. Qualitative data were summarized by analyzing content for common themes.

RESULTS AND CONCLUSIONS

Objective One

Volunteers, on the average, had served for eight years. The majority (64%) of these volunteers were project leaders, who previously had or currently have children participating in 4-H. Fifty-eight percent had also been 4-H members themselves. Three-fourths of the volunteers were found to be female, 90.6% were Caucasian, and 92.3% were married. Almost 73% were employed full time mostly in the fields of accounting/office management, teaching/education, or self-employment. The age of the leaders ranged from 31 to 55, with the greatest number in the 41 to 45 age group. Forty-one percent had attended a college or university, while 33% had completed a college or university. Approximately 42% reported a family income of over $50,000. Almost half of the volunteers lived on a farm or a ranch. The profile of New Mexico 4-H volunteers is similar to ones found in previous studies (Gallup Organization, 1986; Manser, 1987; Steele et al., 1989; Culp, 1996; Independent Sector, 1996).

Objectives Two and Three

Table 1 shows the majority of New Mexico 4-H leader's time was spent on county-wide 4-H activities, teaching projects to 4-H youth, and participating in or preparing for local 4-H club meetings or activities. The least amount of time was spent on recruiting members or leaders, serving on state-wide committees, and receiving or giving 4-H leader orientation or training. Volunteers in New Mexico are concentrating their time to teach youth life skills through projects and club meetings. Steele et al., (1989) found that Extension volunteers were an important community resource, utilized to teach, plan, and implement programs in the areas of agriculture, home economics, community development, and youth development. Clark and Skelton (1950), supported more recently by Culp (1996), found that volunteer 4-H leaders considered the following their most important tasks: helping members with projects and teaching them practical skills, developing desirable character traits in young people, interesting members in 4-H Club work, and advancing 4-H Club work in the community. Volunteers usually complete these tasks as a project leader, organizational leader, or club activity leader (Steele et al., 1989). The majority of time served by volunteers in this study was found to be during the months of June through September, due to the great number of activities implemented through the 4-H Program during this time period

Table 1

Respondents' Total Mean Hours by Activity per Year (n=187)

Activity	Mean Hours	Standard Deviation
Participating in county-wide 4-H activities	68.1	61.9
Teaching projects to 4-H youth	63.7	86.3
Participating in local 4-H club meetings or activities	63.7	71.9
Preparing for local 4-H club meetings or activities	49.8	55.8
Participating in state-wide 4-H activities	43.8	46.3
Coaching county, district and/or state contests	36.9	60.6
Serving on county-wide 4-H committees	27.8	51.1
Recruiting 4-H members (or leaders)	21.0	32.6
Serving on state-wide 4-H committees	18.5	56.7
Receiving 4-H leader orientation or training	13.1	16.0
Giving 4-H leader orientation and training	12.6	15.7
Other	5.9	33.0

Table 2 shows the distribution of total hours spent by respondents for all of the activities listed in Table 1. The minimum number of hours any one particular respondent spent during the year was 7.5 hours. The median number of hours was 369.5 and the maximum number of hours spent by any specific respondent was 2,364 hours. Data represented a positively skewed distribution. The number of volunteer hours reported in the 25th percentile was 179 hours while

574.5 hours was reported at the 75th percentile. In addition the 10th percentile is 73 hours and the 90th percentile is 765.5 hours. The 90th percentile together with the maximum indicates the relatively wide span of values over which the upper 10% are distributed (10% of the respondents fell between 765.5 and 2,364 hours).

Table 2

Distribution of Total Hours Spent (n = 187)

Minimum	25th percentile	Median	75th percentile	Maximum
7.5	179	369.5	374.5	2,364

Objective Four

The majority of leaders made fewer than 25 calls per year and spent under $50 on long distance/pay phone charges, and less than $50 on program supplies. Steele et al. (1989) found that over half of volunteers provided some amount of funds, facilities, or supplies for Extension activities. 4-H leaders in New Mexico are implementing programming while not having to expend too much "out of pocket" expenses. In this study the majority of New Mexico leaders drove more than 500 miles in a year for 4-H programming. Unlike more populated states, New Mexico is a very rural state geographically with only a few major urban centers, requiring greater driving distances and more time to be able to attend both in and out of county events. Nationally, in 1996 the average 4-H volunteer drove 300 to 400 miles and spent approximately $50.00 of their own money (4-H Statistics, 1998).

Objective Five

Motivations for volunteering were that their children were 4-H members, that 4-H was a good organization, and that they enjoyed working with youth. This is consistent with findings from Culp (1996) and Steele et al. (1989). Similarly, Zeutschel and Hansel (1989) discovered parents will most likely volunteer for organizations that benefit their children. In addition, other studies have found that people volunteer because of their need to belong and be affiliated to a group (Henderson, 1981) or they just want to "spend time with youth" and make a difference in young peoples lives (Rouse & Clawson, 1992). New Mexico volunteers have much invested in the 4-H program with a large percentage being former 4-H members and/or having children in 4-H. Forty-two percent of the volunteers reported they had not previously been 4-H members. There is a vast population of potential volunteers in New Mexico that has not been reached that could benefit from the positive aspects of and contribute to the 4-H program. Some under represented groups are male and minority populations, college students, senior citizens, urban based families, and people established in lower income brackets with lower education levels.

Objective Six

Using the 1999 average hourly wage for nonagricultural workers ($14.30) provided by the Independent Sector and the median number of hours contributed, the economic value of average New Mexico adult 4-H leaders' time was $5283.85. Applying this dollar figure, New Mexico volunteers (N = 1,134) contributed an estimated $6 million to the New Mexico 4-H program in 1998. 4-H leaders in New Mexico are highly involved, making significant contributions to the programs in time and money. In 1996, the average 4-H volunteer nationally served about 220 hours per year (4-H Statistics, 1998). Steele's (1985) national study found that volunteers were also of assistance to Extension and to Extension staff, by expanding the hours of contact that Extension agents could not begin to provide with its current level of funding. The value of the time contributed by volunteers far exceeds the amount of time secured through paid staff. New Mexico volunteers in this study reported volunteering more time than in previous studies. Although no definite explanation exists as to why this figure is higher than previous studies, several explanations are possible. New Mexico is considered a rural state. The majority of volunteers surveyed lived on a farm or a ranch. 4-H in New Mexico is a natural pastime for youth living in rural areas and is considered a "way of life" for many New Mexico 4-H youth and volunteers. Research supports that people are more likely to volunteer in programs compatible with their beliefs and values and in activities that their children are involved in. Additionally, volunteers in this study have been leaders for four or more years, indicating a proven dedication to the 4-H program and commitment of time necessary for multiple project activity meetings, fairs, and events. Steele et al. (1989) concluded that the 4-H Program could not survive without it's supportive volunteer component.

Objective Seven

In general, New Mexico leaders felt that 4-H is a positive program that teaches youth life skills such as responsibility, leadership, and community service. Without the 4-H program in their lives, respondents stated they would have felt cheated out of many wonderful experiences. In addition, volunteers made many suggestions for improvement, including: encouraging and recognizing community service projects more, providing more scholarship opportunities, and providing more updated curriculum and project materials. Respondents also felt that individuals who sign up as 4-H leaders should be dedicated to the goals and mission of the program. Volunteers should have high expectations from the youth they work with, encouraging participation among both members and parents. Volunteers stated that as leaders they sometimes felt overwhelmed and that it is important that they feel the agent's support and enthusiasm for all aspects of the program. They felt that leader training is a positive part of the 4-H program and should be emphasized more.

RECOMMENDATIONS AND IMPLICATIONS

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

1. When defining the profile of a New Mexico 4-H adult volunteer, it was found that the

4-H program could be expanded by implementing recruitment strategies that target the "non-traditional" or under-utilized volunteers; including male and minority populations, college students, senior citizens, urban based families, and individuals established in a lower income bracket with lower education levels.

2. Volunteers are an important resource to the 4-H program. They are utilized to teach, plan and implement many programs. CES should continue to emphasize leader involvement in the areas found to have had the most time served in, which were county-wide activities, teaching projects to youth, and preparing for local club meetings or activities. Research has found that volunteers are more motivated and effective in serving areas they have an investment in. However, more time should be invested by 4-H Program administrators to promote leader involvement in activities found to have had the least time served in such as state-wide committee involvement, recruitment, and volunteer training if they wish to expand and increase the educational program relevance of these areas.

3. The economic value of the median New Mexico adult 4-H volunteer leader's time, for the period of one year was determined to be $5,283.85. In 1998, 1,134 volunteers who had served at least four years were enrolled in the New Mexico 4-H Program. Using this dollar figure, New Mexico volunteers contributed an estimated $6 million in time and talent to the state 4-H program in 1998. 4-H Program administrators should use this information to demonstrate the significance and relevance volunteers have to the New Mexico 4-H Program. The figures should be used to address additional funding needs for the 4-H Program in New Mexico.

4. The majority of leaders made less than 25 calls per year, spent under $50 on long distance/pay phone charges, and less than $50 on program supplies. CES should continue to keep these "out of pocket" expenses at a minimum, by allowing leaders to make long distance phone calls from their local office and through providing project materials at a low cost.

5. The majority of leaders in New Mexico drove more than 500 miles in a year for 4-H programs. This is higher than the national average. A mileage reimbursement program should be initiated for volunteers, driving their own personal vehicles, who drive an average of 500 miles per year or more. The reimbursement program could be initiated through 4-H County Councils and fundraising events.

6. When recruiting volunteers, findings from this study should be used to help answer questions such as, "How much time would I be spending?" "What activities would I be expected to be involved with?" "When would I be expected to serve?"

7. Volunteer leaders spent the least amount of time receiving or giving volunteer orientation or training. It is recommended that 4-H Program administrators provide high quality, frequent volunteer orientations and training during the slower months of the year, when leaders are more likely to have time available to devote to leader training.

8. New Mexico 4-H volunteers identified specific volunteer training needed or desired. Volunteer orientation and training should be provided to increase the level of understanding of volunteer leader and parent expectations, to teach leaders how to empower youth and adults, and to instruct them on how to delegate responsibilities to help reduce their feelings of stress. Volunteers also expressed an interest in increasing emphasis on recognizing and improving community service projects, how to search out service projects that will have an impact on their community and how to obtain recognition for the service. Leaders also stated a wish to increase funding and awareness of scholarship opportunities through 4-H.

9. Volunteers indicated they wished to be provided with more updated curriculum and project materials. The state-wide curriculum committee should continue to review all project materials on a rotational basis, with special emphasis on high enrollment project areas. Project revisions and/or adaptations of projects from other states should be made in a timely manner. Additionally, leaders should serve as representative members of the committee.

10. In-service training on volunteer management should be provided to assist agents in coordinating a strong volunteer development program that meets the needs of their volunteers.

The information collected from this study can be used by both state and county staff and New Mexico to help improve programs, recruit volunteers, and justify the spending of public dollars for 4-H programming. Research findings can be used for program planning, recruitment and accountability purposes. The program planning and recruitment aspects are primarily useful to Cooperative Extension Service Staff. For example, average hours spent by adult volunteer leaders in different project areas will be available to use in recruiting when potential volunteers ask, "How much time would I likely be spending? Monthly patterns of activity for adult leaders will be available to determine months when most leaders would be active and open to respond to surveys, training sessions, and information concerning new aspects of certain projects.

The data relating to the nature and extent of leader involvement can be used for accountability purposes (impact figures relating to time spent by volunteer leaders in support of their leadership activities) and can be shared with funding agencies, donors, and sponsors, as well as to provide recognition to volunteers serving in the program. Finally, general background data on volunteer leaders will enable a "leader volunteer profile" to be formulated containing characteristics of New Mexico 4-H volunteer leaders to aid in recruitment efforts.

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A Comparison of Student Teachers' Perceptions of Important Elements of the Student Teaching Experience Before and After Completing an 11-week Field Experience

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Abstract

Two purposes of this study were to describe selected characteristics of student teachers and their cooperating student teaching centers, and to identify student teachers' perceptions about important elements of the student teaching experience before and after its occurrence. Thirty-six student teachers who completed a 11-week field experience at 33 different cooperating centers during the 2000-2001 academic year provided the responses for this study. The questionnaire items were divided into five "core" areas of the student teaching experience based on a review of literature. Thirty-four elements were identified by cooperating teachers as being "important." Student teachers rated the elements using a Likert-type rating scale ("5" = "High Importance,"... "1" = "No Importance"). The return rate was 100%. Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .72 to .95 for the "pretest" and from .69 to .90 for the "posttest." The overall importance scale of 34 items yielded estimates of .96 and .89, respectively. Students recognized the importance of the "Cooperating Teacher-Student Teacher Relationship" both before and after the field experience component of student teaching. All elements were rated as important by student teachers, suggesting that the student teachers' espoused theory of action was congruent with and led to their theory-in-use.

Introduction/Theoretical Base

Researchers have argued that the student teaching experience plays a significant role in the formation of attitudes and perceptions of preservice teachers regarding their roles and responsibilities as future practitioners. This postulate also includes those individuals who aspire to be agriculture teachers (Briers & Byler, 1979; Byler & Byler, 1984; Schumacher & Johnson, 1990; Schumann, 1969). Further, investigators (Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Garton & Cano, 1994; Martin & Yoder, 1985; Norris, Larke, & Briers, 1990) have opined that for prospective agriculture teachers the cooperating teacher and the cooperating student teaching center are two of the most significant components of the student teaching experience.

DeMoulin (1993) stated that a cooperating teacher should "foster unique teaching concepts and...give support and encouragement to preservice teachers" (p. 160). To this end, Garton and Cano (1994) contended that cooperating teachers should be selected who demonstrated the "desired teaching behaviors expected of [agriculture] student teachers" (p. 213). In support, Martin and Yoder (1985) opined that an agriculture student teacher's "success" during their field experience hinged "on the general supervisory climate in the department and on the educational leadership abilities of the cooperating teacher" (p. 21).

Moreover, Deeds and Barrick (1986) and Byler and Byler (1984) found that the behaviors of agriculture cooperating teachers and programmatic qualities of cooperating centers, to the extent that they demonstrated or exemplified positive attitudes and morale, did positively influence the perceptions of preservice teachers about the agriculture teaching profession. Further, Edwards and Briers (2000) have reported the perceptions of agriculture cooperating teachers about important elements of the student teaching experience. (These were teachers and centers used by the Department of Agricultural Education, Texas A&M University.) The researchers recommended that student teachers should be surveyed using a similar instrument. They asserted that armed with a "'greater' understanding of both groups' perceptions, teacher educators can [could] design and implement preservice learning activities to address any incongruence that might be a limiting factor preventing development of an effective cooperating teacher-student teacher relationship" (p. 567).

In explaining the assumptions that undergird how humans integrate thought and action, i.e., deliberate human behaviors, Argyris and Schön (1989) postulated that an individual's "theoretical" explanation about how he or she would respond (behave) under a given set of conditions is that person's "espoused theory of action" (p. 6) for that particular circumstance. Moreover, "the theory that actually governs his [or her] actions is his [or her] theory-in-use" (p. 6), that is, the unfolding of one's actual behaviors for a given situation (Figure 1). In addition, these researchers stated that "skills are dimensions of the ability to behave effectively in situations of action" (p. 12), and that one's "theory of action has not been learned in the most important sense unless it can be put into practice" (p. 12). For example, these behaviors could include the skills and practices associated with teaching that a preservice teacher would exercise during the student teaching experience.

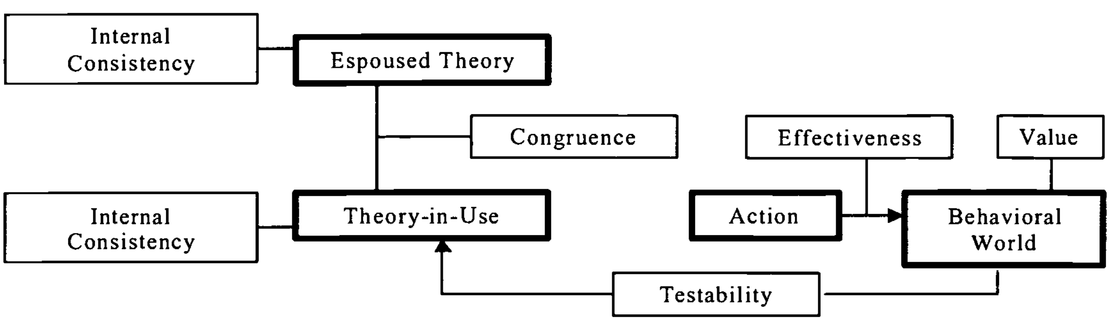

Figure 1. Espoused theory versus theory-in-use (taken from Argyris and Schön, p. 21).

Further, Argyris and Schön hypothesized that each person lives in a behavioral world of his [or her] own—a world made up of his [or her] own behavior in interaction with the behavior of others. Each person's behavioral world is therefore artificial not only in the sense that it consists of artifacts of human convention but in the sense that it is shaped and influenced by one's own action and by one's theories of the behavioral world as they influence action. (p. 17)

Concomitantly, Willis (1991) argued that "perceiving precedes making meaning or acting" (p. 175), and thus as circumstances (experiences) change so too may one's perception of their "behavioral world." Similarly, Kolb's learning cycle posits that experience holds the potential for transforming one's worldview, and therefore frequently dictates the individual's selection of new experiences (Miller, 1999, n.p. #).

Finally, Korthagen and Kessels (1999) contended that student teachers need "knowledge that is situation-specific and related to the context in which they meet a problem or develop a need or concern, knowledge that brings their already existing, subjective perception of personally relevant classroom situations one step further" (p. 7). These researchers also emphasized the importance of "level reduction" (pp. 10 & 12). That is, the role of experience ("concreteness") as it relates to the formation of accurate "Gestalts" or cognitive "schemas" (Figure 2) that are necessary for student teachers to understand, interpret, and synthesize their immediate contexts and related behaviors—their "subjective theories" (p. 12).

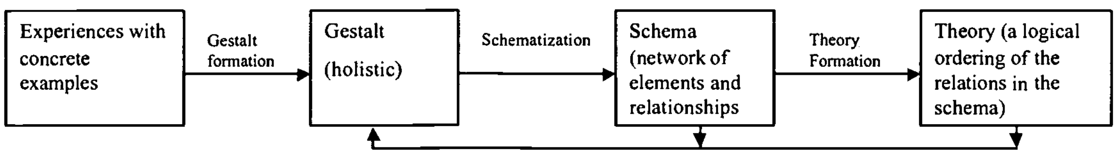

Figure 2. Levels in the process of learning with regard to a certain domain (taken from Korthagen and Kessels, p. 10).

Purposes and Research Questions

Two purposes of this study were to describe selected characteristics of student teachers and their cooperating student teaching centers (schools) and to identify what student teachers perceived to be important elements of the student teaching experience before and after completing an 11-week field experience.

Five specific research questions guided the study: 1) What were selected personal and professional characteristics of student teachers from the Department of Agricultural Education, Texas A&M University, during the 2000-2001 academic year? 2) What were selected characteristics of cooperating student teaching centers used by the Department of Agricultural Education, Texas A&M University, during the 2000-2001 academic year? 3) What did student teachers perceive to be important elements of the student teaching experience before completing an 11-week field experience? 4) What did student teachers perceive to be important elements of the student teaching experience after completing an 11-week field experience? 5) Were student teachers' perceptions of the important elements of the student teaching experience significantly different following completion of an 11-week field experience compared to their perceptions before the field experience?

Methods and Procedures

This was a descriptive study to determine selected characteristics of student teachers and their cooperating centers and to identify student teachers' perceptions of the important elements of the student teaching experience before and after completing an 11-week field experience. In 1998, the Department of Agricultural Education at Texas A&M University hosted an agriculture cooperating teacher workshop. A portion of the workshop included a focus group exercise to determine cooperating teachers' perceptions of the "important elements" of the student teaching experience. The participants included teachers and schools that had either served as cooperating student teaching centers during the previous three years or were future placement sites. Prior to the workshop, the teachers were divided into five different focus groups of seven members each. Each of the five focus groups represented a "core" component (area) of the student teaching experience as identified by a review of literature (Briers & Edwards, 1998; Claycomb & Petty, 1983; Edwards & Briers, 1998; Larke, Norris, & Briers, 1992; Martin & Yoder, 1985) and by teacher education faculty in the Department of Agricultural Education at Texas A&M University. The five core areas were classroom and laboratory instruction, supervised agricultural experience programs (SAEPs), student leadership development (FFA), school and community relationships, and cooperating teacher-student teacher relationships. The teachers identified 34 elements of the student teaching experience as being "important."

Further, in an effort to "confirm" these findings, the 34 important elements (items) were included in a mail questionnaire sent to the cooperating teachers following the workshop. The instrument was divided into five "core" areas of the student teaching experience and included the 34 "important elements": classroom and laboratory instruction (5 items), supervised agricultural experience programs (SAEPs) (4 items), student leadership development (FFA) (7 items), school and community relationships (9 items), and cooperating teacher-student teacher relationships (9 items). The teachers were asked to "rate" the "level of importance" of the elements (Edwards & Briers, 2000). Cooperating teachers perceived all of the items to be either "much" or "high" in importance" ($\underline{M} \geq 4.00$); the overall mean was 4.54. Cronbach's coefficient alpha reliability estimate for the overall importance scale was .91.

For the purpose of this study, the 34 important elements (items) comprised one part of a questionnaire administered to student teachers to identify their perceptions of "level of importance" of these elements of the student teaching experience, before and after their completion of an 11-week field experience. The student teachers were asked to rate the "level of importance" of the elements using a Likert-type rating scale ("5" = "High Importance," "4" = "Much Importance," "3" = "Some Importance," "2" = "Low Importance," and "1" = "No Importance"). Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .72 to .95 for the "pretest" and from .69 to .90 for the "posttest." The overall importance scale of 34 items yielded estimates of .96 and .89, respectively. The second part of the instrument included 22 questions describing selected personal and professional characteristics of the student teachers, and selected characteristics of their cooperating student teaching centers.

The data were collected at two points during the student teaching semester. First, data were collected at the conclusion of the four-week on-campus portion of student teaching. Data were again collected at the conclusion of the eleven-week off-campus field experience. Responses were recorded on scan sheets, coded for respondent, semester, and pre and posttest. Scan sheets were then optically scanned and analyzed using the <u>Statistical Package for the Social Sciences v. 9.0</u>. Pre and post responses were paired for comparison purposes. Research questions one through four were analyzed descriptively with frequencies, percentages, means, and standard deviations. Research question five was analyzed using paired sample t-tests using a recurring measure (pre and post test). A 100% response rate was achieved.

Results/Findings

As shown in Table 1, the student teachers who participated in this study were almost evenly split between male (19) and female (17); only three of the 36 respondents were earning

Table 1

Selected Characteristics of Student Teachers (N=36)

Characteristics	Frequency	Percentage
Gender		
Male	19	52.8
Female	17	47.2
Highest Degree After Student Teaching		
Bachelor's	33	91.7
Master's	3	8.3
Plans to Obtain Teacher Certification in Other Areas		
No	13	36.1
Yes, in biology	4	11.1
Yes, in life-earth science	1	2.8
Yes, in composite science	9	25.0
Yes, in fields other than those above	9	25.0
Interested in a Graduate Degree		
Definitely not	0	0.0
Probably not	3	8.3
Unsure	9	25.0
Probably yes	12	33.3
Definitely yes	12	33.3
Years Expected to Teach Agriscience		
I do not plan to teach agriscience	7	19.4
1 to 2 years	2	5.6
3 to 5 years	6	16.7
6 to 10 years	8	22.2
11 or more years	13	36.1
In What Size School Do You Hope to Teach		
779 students or fewer	18	50.0
780 students or more	16	44.5
Other, e.g. magnet or career center	2	5.6
Value of IMS Materials to Preparation		
No Value	0	0.0
Limited Value	10	27.8
Average Value	14	38.9
Much Value	11	30.6
Great Value	1	2.8

(table continues)

Characteristics	Frequency	Percentage
Need for New Instructional Materials		
No need	0	0.0
Little need	1	2.8
Some need	14	38.9
Much need	10	27.8
Great need	11	30.6
Value of Distance Technologies		
Not valuable	1	2.8
Limited value	7	19.4
Average value	4	11.1
Valuable	17	47.2
Very valuable	7	19.4
Ability to Integrate Distance Technology		
Not competent	4	11.1
Somewhat competent	4	11.1
Uncertain	13	36.1
Competent	13	36.1
Highly competent	2	5.6

master's degrees while the remainder were earning bachelor's degrees. Over one-third (13) of the student teachers planned to earn certification only in agricultural science. The remainder planned to pursue certification in some other field. Moreover, two-thirds reported an interest in pursuing graduate studies. Four-fifths (80.6%) of the student teachers indicated that they would teach agricultural science for one or more years.

Thirty-five of the 36 student teachers reported "some...," "much...," or "great need" for the development of new instructional materials. Two-thirds of the respondents indicated that distance education technologies were either "valuable" (17) or "very valuable" (7) instructional tools for agricultural education. However, a majority of respondents expressed that they were either "uncertain" about their ability to integrate distance technologies (13) or that they lacked the sufficient competence (8) to do so (Table 1).

When describing their school settings (Table 2), 28 of the 36 respondents reported student teaching in a school of 780 students or larger. (This school size benchmark is a widely recognized point of demarcation between "large" and "small" high schools in Texas.) Three-fourths (27) reported either two or three classrooms comprised their cooperating center facility. With regard to laboratory facilities, a majority had access to agricultural mechanics facilities (35), greenhouses (20), and project centers (22). However, a large majority reported not having access to meats (31), aquaculture (28), or land (27) laboratories.

A majority of respondents indicated that they had access to email (33) and the World Wide Web (34) in their cooperating agricultural department; however, student access to the World Wide Web (17) was less common. Too, eight student teachers did report that there were computer labs for student use located in their center's facility (Table 2).

Table 2

Selected Characteristics of Cooperating Student Teaching Centers (N=36)[a]

Characteristics	Frequency	Percentage
School		
Campus Size		
779 students or fewer	8	22.2
780 students or more	28	77.8
Agriscience Department		
Number of Classrooms		
1	1	2.8
2	15	41.7
3	12	33.3
4 or more	8	22.2
Ag Mech Laboratory		
Yes	35	97.2
No	1	2.8
Greenhouse		
Yes	20	55.6
No	16	44.4
Horticulture Facility (Not a Greenhouse)		
Yes	18	50
No	18	50
Meats Laboratory		
Yes	5	13.9
No	31	86.1
Aquaculture Facility		
Yes	8	22.2
No	28	77.8
Land Laboratory		
Yes	9	25.0
No	27	75.0
Project Center/Feeding Facility		
Yes	22	61.1
No	14	38.9
Email Access at Cooperating Center		
No access	1	2.8
No access in department	2	5.6
Access in department	33	91.7
Access to World Wide Web		
No access	1	2.8
No access in department	1	2.8
Access in department	34	94.4
Student Access to Technology		
No access	2	5.6
Access outside the facility	5	13.9
Access to computers, no www	4	11.1
Access to computers with www	17	47.2
Facility includes a computer lab	8	22.2

[a] Table represents the settings of 36 different student teachers in 33 cooperating centers.

The 34 "important elements" of the student teaching experience were rated by student teachers on level of importance ("5" = "High Importance"..."1" = "No Importance") via a questionnaire (Table 3). The overall pretest and posttest means were 4.47 and 4.39, respectively, or approaching midway between "much" and "high importance." In the pretest, the two highest rated elements were "A cooperating teacher who is willing to be a mentor" and "A cooperating teacher who communicates clear expectations" (4.77), followed by "A discipline management plan used in a structured environment" (4.75). Lowest rated elements in the pretest included

Table 3

Student Teachers' Perceptions of the Important Elements of the Student Teaching Experience Before and After Completing an 11-week Field Experience (N=36)

Elements[a]	PreTest		PostTest	
	M[b]	SD	M[b]	SD
Classroom and Laboratory Instruction				
Daily (systematic) classroom and/or laboratory instruction	4.56	.65	4.39	.73
A discipline management plan used in a structured environment	4.75	.50	4.44	.50
Current technology used in instruction	4.08	.91	4.17	1.00
Creative teaching methods as a basis for daily instruction, e.g., use of multimedia and varied teaching techniques	4.39	.84	4.22	.93
A well-rounded program emphasizing instruction, SAEs, and youth leadership activities	4.69	.58	4.78	.49
Composite Mean[c]	4.49	.47	4.40	.52
Supervised Agricultural Experience Programs				
All students meeting state SAEP requirements, with accurate record books	4.40	.65	3.89	1.08
Diversity within the students' SAEPs	4.06	.79	3.89	.98
Project supervision and an explanation of this commitment to the student teacher	4.47	.56	4.00	1.04
Student participation in advanced awards and degrees on district, area, state and national levels	4.31	.67	4.22	.96
Composite Mean[c]	4.31	.49	3.98	.85
Student Leadership Development (FFA activities)				
Strong classroom instruction in leadership development	4.36	.80	4.44	.61
These activities as essentials for a balanced program	4.31	.62	4.39	.62
A history of successful participation	4.00	1.01	4.14	.90
Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs and LDEs)	4.50	.74	4.53	.84
Cooperating teachers who delegate the training of at least one team to the student teacher	4.36	.72	4.36	.76
Resources available to train a competitive team	4.44	.61	4.58	.65
Opportunities for the student teacher to judge or monitor a district or area Leadership Development Event (LDE)	4.17	1.03	4.25	.81
Composite Mean[c]	4.13	.58	4.39	.51

(table continues)

Elements[a]	PreTest		PostTest	
School and Community Relationships				
Recognized integrity of the cooperating teacher and program	4.54	.70	4.66	.59
Departmental support organization(s) (e.g., advisory committees, booster clubs, and Alumni)	4.34	.76	4.54	.56
A cooperating teacher who supports other school activities (e.g., sports banquets)	4.47	.70	4.25	.77
A cooperating teacher who supports activities in the community (e.g., service organizations)	4.47	.70	4.36	.64
A spirit of professional cooperation among fellow teachers	4.57	.56	4.54	.61
Use of local media	4.09	1.01	4.14	.69
School administrators who are involved in program activities	4.49	.78	4.57	.61
Community service projects	4.43	.61	4.26	.70
Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm)	4.57	.66	4.49	.74
Composite Mean[c]	4.44	.56	4.43	.48
Cooperating Teacher-Student Teacher Relationships				
A cooperating teacher who is willing to be a mentor	4.77	.43	4.67	.76
A student teacher who is willing to be mentored by the cooperating teacher	4.69	.53	4.72	.66
A cooperating teacher who has a positive attitude	4.74	.61	4.69	.62
A cooperating teacher who is a "good" role model	4.69	.58	4.56	.84
A cooperating teacher who communicates clear expectations to the student teacher (e.g., role in the classroom and calendar of events)	4.77	.43	4.64	.64
A cooperating teacher who provides frequent evaluations and feedback to the student teacher	4.69	.53	4.50	.81
Discipline policies that are in place and enforced	4.69	.53	4.48	.94
"Reinforcement" techniques in teaching (e.g., pace, reteaching, retesting, and accommodation of various learning styles)	4.63	.60	4.42	.97
Assistance in job placement	4.40	.85	4.33	.96
Composite Mean[c]	4.67	.46	4.56	.60
Overall Mean	4.47	.41	4.39	.39

[a]Important elements were determined by cooperating teacher focus groups and reflect the "language" of those groups. [b]5 = High Importance…1 = No Importance. [c]Composite mean of elements for that core area.

"Diversity within students' SAEPs" (4.06) and "A history of successful participation" (4.00). In the posttest, the highest rated elements included "A well-rounded program emphasizing instruction, SAEs, and youth leadership activities" (4.78) and "A student teacher who is willing to be mentored by the cooperating teacher" (4.72). Lowest rated elements included "All students meeting state SAEP requirements with accurate recordbooks" and "Diversity within students' SAEPs" (3.89).

The elements were grouped conceptually into five "core" areas, and a "composite" mean was computed for each area. The highest rated core area both pre and posttest was "Cooperating Teacher-Student Teacher Relationships" (4.67 and 4.56, respectively). Ranked core areas for the pretest resulted in "Classroom and Laboratory Instruction" (4.49) ranked second, "School and

Community Relationships" (4.44) ranked third, and "Supervised Agricultural Experience" along with "Student Leadership Development" tied for fourth and fifth (4.31). The posttest resulted in similar findings with "School and Community Relationships" (4.43) ranked second, "Classroom and Laboratory Instruction" (4.40) ranked third, "Student Leadership Development" (4.39) ranked fourth, and "Supervised Agricultural Experience Programs" (3.98) ranked fifth.

Conclusions, Implications, and Recommendations

Student teachers were almost equally divided by gender, and more than half were interested in either beginning or advancing in graduate study. Most planned to teach agriscience after completing their student teaching experience. Though student teachers considered distance education technologies valuable, they were uncertain of their ability to integrate these technologies into instruction. Cooperating student teaching centers used by the Department of Agricultural Education at Texas A&M University were predominantly large, with high schools having more than 780 students and agriscience departments having more than two classrooms that were well-equipped with Internet and email access.

Student teachers recognized the importance of the cooperating teacher-student teacher relationship both before and after the field experience component of student teaching. Other researchers have supported this conclusion (Martin & Yoder, 1985). Though all elements were rated as important by student teachers, negative change was seen for the importance of "Supervised Agricultural Experience Programs" and "Classroom and Laboratory Instruction."

The perceptions of student teachers about the important elements of the student teaching experience, although while remaining important, declined in all core areas following completion of their 11-week field experience. This may mean that after experiencing the "the real-time conditions" of teaching and having had opportunities to create and test various "ad hoc theories" (e.g., methods of instruction), the "espoused theories" held by student teachers changed and thus their perceptions have now moved more closely to a realistic and "tested" theory of practice or action (Argyris & Schön, 1989). Further, these changes in perception may have been produced by the "level reduction" or coalescence of "subjective" and "objective" theories described by Korthagen and Kessels (1999). Accordingly, if these are valid suppositions and the constructs on which student teachers' perceptions were assessed are supported by the literature as well as the perceptions of other key actors (i.e., cooperating teachers), then this may be further evidence that supports the need for the "concrete" experiences afforded by student teaching, ones that assist novice teachers in "formalizing" their professional behaviors.

Recommendations for practice and future research follow: 1) Responses of student teachers should be compared to those of cooperating teachers to examine where differences in their perceptions occur. These differences could serve as additional research foci. Further, with a "greater" understanding of both groups' perceptions, teacher educators could design and implement preservice learning activities to address any incongruence that might be a limiting factor preventing development of an effective cooperating teacher-student teacher relationship (Martin & Yoder, 1985). 2) Because the items for the survey were generated primarily during focus groups of cooperating teachers, student teachers should be assessed using qualitative techniques to determine if they identify additional items of importance. 3) Further, because all items on this instrument were rated as "important" (high or much importance) by student teachers, one should examine current practices in student teaching to determine if there are aspects that may be unimportant to the experience or issues that could be addressed in alternative settings such as through early field-based experience. 4) Other researchers (Dyer & Osborne, 1995) found that agriculture teachers were ambivalent with respect to the role of SAEs in agricultural education. In this study, after participating in a field experience and being exposed to related behaviors of their cooperating teachers, student teachers' perceptions about important elements of SAEs declined (Table 3). Moreover, perhaps most troubling was the negative change that occurred regarding the element of "diversity" as it pertained to SAEs. This downward "adjustment" in perception, about a "fundamental" component of agricultural education, warrants additional study.

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Characteristics of Preservice Teacher Education Programs In Agricultural Education in the United States

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Abstract

Teacher education programs throughout the United States are constantly being bombarded with calls for reform and increased standards. With most preservice teacher education programs in agriculture being encouraged, or required, to reform their programs, it is important to ascertain the characteristics of these programs throughout the United States. The purpose of this study was to ascertain the characteristics of preservice teacher education programs in agriculture in institutions of higher education in the United States. The target population for the study was all postsecondary institutions in the United States that offered pre-service programs in agricultural education. The instrument was sent to all recipients by electronic mail in the spring of 2000. A total of 61 completed surveys were returned by email, fax or mail for a response rate of 66%. An overwhelming percentage (82%) of preservice teacher education programs in agriculture were 4-year programs in length. Almost two-thirds of the programs (59%) were housed in Colleges of Agriculture at their institutions. Seventy-seven percent of institutions required a 2.5 G.P.A. for admission to teacher education. Almost half of the programs (49.2%) offered student teaching in the spring of the year. The length of the student teaching experience ranged from seven to 36 weeks for agricultural education majors. Respondents also indicated the length of student-teaching for various teacher education programs. When compared to other preservice teacher education programs, agricultural education was slightly shorter with a mean length for student-teaching of 13.78 weeks.

Introduction

Teacher education programs throughout the United States are constantly being bombarded with calls for reform and increased standards. Numerous studies over the past decade have investigated teacher preparation including *Achieving World Class Standards: The Challenge for Educating Teachers* (US Department of Education, 1992), *What Matters Most: Teaching for America's Future* (National Commission on Teaching & America's Future, 1996), and *Transforming the Way Teachers Are Taught* (American Council on Education, 1999). Teacher education has also witnessed the increased importance of standards as identified by the National Council for the Accreditation of Teacher Education (NCATE), the Interstate New Teacher Assessment and Support Consortium (INTASC) and the National Board of Professional Teacher Standards (NBPTS). While all of these reports and organizations have called for increased requirements and improved teacher education programs, most have developed general standards which do not begin to outline how much technical preparation preservice teachers should receive, standards for admission into teacher education or characteristics of field-based experiences preservice teachers should complete. With most preservice teacher education programs in agriculture being encouraged, or required, to reform their programs, it is important to ascertain the characteristics of these programs throughout the United States.

Theoretical Base

The Center on Education and Training for Employment (Lynch, 1997) stated that, "the greatest changes being implemented in vocational teacher education programs were in response to state legislated or mandated reforms, such as to increase entrance and exit grade point requirements, teacher testing, and the time devoted to field-based experiences" (p. 40).

A study conducted by the National Dissemination Center for Career and Technical Education (2000), states:

> In an effort to improve the quality of new teachers, policies establishing a minimum undergraduate GPA as a prerequisite to admission to a teacher certification program were instituted. Pennsylvania, for example, recently adopted Chapter 354 of the Public School Code, *General Standards for the Institutional Preparation of Professional Educators*. Included in its provision are the following minimum grade point averages for admission into teacher education degree programs: 1) 2.6 GPA for the 2001-02 academic year; 2) 2.8 GPA for the 2002-03 academic year; and 3) 3.0 GPA for the 2003-04 academic year. These requirements may well contain some unanticipated consequences for Career and Technical Education... (p. 11)

In a study conducted by Swortzel (1997), the median grade point average required for admission to teacher education in agriculture was 2.5. The researcher also found that only 20 of the 73 programs that responded required the ACT and 20 programs required the Pre-Professional Skills Test (PPST) for admission. The median scores required for the PPST tests was 170 for math, and 172 for reading and writing. Swortzel also found that the length of student-teaching ranged from 10 to 24 weeks with a median number of 12 weeks. Teacher education programs have for years relied on the standard of 10 weeks of student-teaching for preservice teachers. The *Standards for Quality Vocational Programs in Agricultural/Agribusiness Education* for the State of Iowa (Department of Agricultural Education, Iowa State University) included the following two standards: "22. A minimum of 10 weeks of student teaching is required in the area for which certification is to be graded" (p. X-6) and "26. Each student teacher is observed and supervised a minimum of three times in the cooperating school by a teacher educator"
(p. X-7).

In addition to increased G.P.A. requirements, there has been a call for increased field-based experiences for preservice teachers. One of the greatest pushes for increased length of field-based experiences for preservice teachers came from the report *What Matters Most: Teaching for America's Future* by the National Commission on Teaching & America's Future (1996). The report called for the development of "extended, graduate-level teacher-preparation programs that provide a year-long internship in a professional development school" (p. vii).

The report by the National Commission on Teaching & America's Future (1996) also addressed the issue of clinical experiences and supervision for preservice student-teachers. The report stated that "universities should focus as much on building strong clinical training and induction programs - including preparing and supporting cooperating teachers and mentors so that they become excellent teachers of teachers and partners in the teacher education process" (p. 77).

In looking at the role of cooperating teachers and university supervisors in supervising student-teachers Veal and Rikard (1998) found that "...decisions about student teaching, including the assignment of grades, are made by the university" (p. 112). The researchers went on to state that "CTs [cooperating teachers] in this study indicated that they did not usually collaborate with the USs [university supervisors] because they make relatively few visits to the schools" (p. 112).

Purpose and Objectives

The purpose of this study was to ascertain the characteristics of preservice teacher education programs in agriculture in institutions of higher education in the United States. The specific objectives included:

1. Describe the length and location of preservice teacher education programs in agriculture.

2. Describe the requirements for admission into preservice teacher education programs in agriculture.

3. Describe the characteristics of student-teaching when compared to other preservice teacher education programs.

4. Determine if preservice teacher education programs in agriculture were planning major changes in the future.

Methods

This was a descriptive research study that followed the one-shot case study *(X O)* design identified by Campbell and Stanley (1963). The survey instrument was developed by the researchers and reviewed for content and face validity by the teacher educators in agriculture at the researchers' land-grant institution. The target population for the study was all postsecondary institutions in the United States that offered pre-service programs in agricultural education. The list of institutions was obtained from the AAAE Directory of University Faculty in Agricultural Education (Dyer, 1999). Frame error was controlled by reviewing the list with other teacher educators to determine if any institution was missing or should not be sent a survey instrument. The researchers identified one person in each institution, either the department head or head teacher educator to receive the survey. The resulting target population included 92 institutions. A census was conducted do to the small number of institutions in the target population.

The instrument was sent to all recipients by electronic mail in the spring of 2000. A second email was sent to all non-responding institutions two weeks after the initial email survey was sent. A third email was sent one week later. A total of 61 completed surveys were returned by email, fax or mail for a response rate of 66%. To control for non-response error, responses were coded by the date they were received. Early and late responses were compared on selected descriptive program variables. No significant differences were found therefore the findings can be generalized to the target population (Miller & Smith, 1983). The data were analyzed using the Statistical Package for the Social Sciences (v. 10.0) (Norušis, 1997). Frequencies, means and standard deviations were used to analyze the data.

Results

An overwhelming percentage (82%) of preservice teacher education programs in agriculture were 4-year programs in length. Only seven programs indicated that they were 5-year programs. One indicated they could be either a 4- or 5-year program depending on the career aspirations of the student. Almost two-thirds of the programs (59%) were housed in Colleges of Agriculture at their institutions. Slightly over a quarter (26.2%) were in Colleges of Education and nine programs were located in some other college. Some of the colleges included College of Human Resources and Education, Applied Arts & Technology, Applied Science & Technology, Business, Industry, Life Sciences and Agriculture, Professional & Applied Sciences and the College of Applied Human Sciences. The information for length of program and its location is shown in Table 1.

Table 1

Characteristics of Pre-Service Teacher Education Programs in Agriculture (N=62)

Characteristic	Frequency	Percentage
Length of Program		
4-year	50	82.0
5-year	7	11.5
Both 4- and 5-year	4	6.6
Location of Program		
College of Agriculture	36	59.0
College of Education	16	26.2
Other	9	14.8

Teacher educators were asked to identify when preservice students were admitted to their teacher education program. The most frequently cited period when students are admitted was their junior year in college. One institution admitted students when they enrolled in the major as a freshman. Three institutions indicated students could enroll at any time from their freshman through their senior year.

In order to be admitted to the preservice program in agricultural education students had to maintain a minimum grade point average (G.P.A.). One institution admitted students who had a G.P.A. of 2.0. Seventy-seven percent of institutions required a 2.5 G.P.A. for admission. The highest G.P.A. of 3.0 was required by one teacher education program. Table 2 contains the frequency and percentages for each ordinal G.P.A. category.

Table 2

Grade Point Average Required for Admission to Preservice Teacher Education in Agriculture Programs (N=61)

Grade Point Average	Frequency	Percentage
3.00	1	1.6
2.85	1	1.6
2.80	3	4.9
2.75	5	8.2
2.70	1	1.6
2.66	1	1.6
2.60	1	1.6
2.50	47	77.0
2.00	1	1.6

Note. G.P.A. was on a 4.0 scale

Teacher educators were asked to identify other programmatic requirements for admission into their preservice teacher preparation program. Between 42% and 56% of programs require a minimum grade in Introduction to Teaching, Communications, English and Math courses for admission to teacher education. The most frequently required minimum grade in these courses was a 2.0 or "C." A small percentage of programs required either the American College Test (ACT), Scholastic Aptitude Test (SAT) or Pre-Professional Skills Test (PPST) (Table 3).

More than 90% of institutions were on the semester system. Only 5 institutions (8.3%) were on the quarter system. The teacher educators were asked to indicate how many credits were required of technical agriculture, agricultural education, science and general education and for graduation. The credits required for these areas for programs on the semester and quarter systems are shown in Table 4. Teacher educators were asked to indicate if they required an early-field experience for their preservice students prior to student-teaching. Slightly over half (54.1%) required an early field experience in the fall and 29.5% required one in the spring. Exactly two-thirds of programs (66.7%) provide a workshop for cooperating teachers who will be working with student-teachers. The length of the workshops ranged from two hours to a complete 45 hour - 3 credit required course. The average length of the workshops was 8.9 hours. Fifty-six programs (93.3%) had the cooperating teachers participate in the grading process.

Table 3

Pre-Service Teacher Education Program Requirements

Admission Requirement	Frequency	Percentage	Range
Introduction to Teaching	33	54.1	
Communications	26	42.6	
English	34	55.7	
Math	26	42.6	
ACT and/or SAT	10	16.4	19-23 (ACT) 860-1100 (SAT)
PPST	13	21.3	169-174 (Math) 170-176 (Reading) 170-176 (Writing)

Table 4

Credits Required for Completion of a Preservice Teacher Education Program

Category	Quarter System (n=5)			Semester System (n=55)		
	Range	Mean	Median	Range	Mean	Median
Technical Agriculture	43-101	62.80	60	16-60	43.44	45
Agricultural Education	18-45	36.00	38	3-72	26.22	27
Science (e.g. biology, chemistry, physics, etc.)	8-30	20.00	21	8-32	14.52	13
General Education (English, Math, Humanities, etc.)	9-72	31	21.5	3-60	34.64	37
Graduation	120-190	162.0	169	120-149	128.76	128

Teacher educators were asked when their preservice students completed student teaching. Almost half of the programs (49.2%) offered student teaching in the spring of the year. Only six programs offered student teaching in the fall and one required a full-year internship. The length of the student teaching experience ranged from seven to 36 weeks for agricultural education majors. Respondents also indicated the length of student-teaching for various teacher education programs. When compared to other preservice teacher education programs, agricultural education was slightly shorter with a mean length for student-teaching of 13.78 weeks. Table 5 shows the data for student-teaching.

Table 5

<u>Characteristics of Student-Teaching in Teacher Education in Agriculture Programs</u>

Student-Teaching	Frequency	Percentage	
Fall semester or quarter Spring	6	10.2	
semester or quarter Either fall or spring	29	49.2	
Full-year internship	23	39.0	
	1	1.7	
Length of Student Teaching (weeks)	**Mean**	**Median**	**Mode**
Agricultural Education	13.78	12	12
Career & Technical Ed. Secondary	14.60	15	16
Education	15.49	15	16
Elementary Education	16.64	15	16

Teacher educators were asked who supervises the student-teachers, how many supervisory visits are made and how long the normal visit lasts? An overwhelming percentage of supervisory visits were made my faculty members in agricultural education. Only three programs indicated that visits were made by faculty members in the College of Education. The number of supervisory visits ranged from two to 10. The median number of visits was three. The length of visits ranged from one hour to eight hours. The mean length of the visits was 5.44 hours. Table 6 shows the data for the number and length of supervisory visits.

Teacher educators were also asked if their preservice teacher education program in agriculture was planning any major changes in the structure of the program in the near future. Almost half (45.0%) indicated that they were planning changes. Slightly over 46% responded that they were not planning changes and 8.3% stated they had just made changes within the past few years. Five programs were planning changes in education coursework, three programs were anticipating changes in the required grade point average for admission to teacher education and two programs were considering changes in the length of the student-teaching experience.

Table 6

Characteristics of Supervisory Visits to Preservice Student Teachers in Agriculture

Characteristic	Mean	Median	Mode
Number of supervisory visits	3.77	3.00	3.00
Length of supervisory visits (hours)	5.44	6.00	8.00

Conclusions

The majority of preservice teacher education programs in agriculture remain 4-year programs. Even with the push for increased admission requirements the most often required grade point average for admission to teacher education was still 2.5 on a 4.0 scale. Only 10 programs required a G.P.A. greater than 2.75. Less than 13 programs required a minimum score on either the ACT, SAT or PPST examinations for admission to teacher education. The amount of course work in technical agriculture averages 60 credits hours for quarter programs and 45 credit hours for semesterized programs. The overall credits for graduation averaged 162 hours for quarter based programs and 128 hours for semester based programs. This probably remains stable due to the pressure from university boards and state legislatures to allow students to graduate within 4 to 5 years.

Most student teaching experiences occur during the spring of the year. A slightly smaller percentage of programs allow preservice students to complete student-teaching in either the fall or the spring. Only one program indicated they required a full-year internship for preservice students in agricultural education. The length of student teaching varied based on the type of program. Agricultural education required the least amount of student teaching time with a mean of 13.78 weeks. This is the lowest when compared to other career and technical education areas (□=14.60), secondary education (□=15.49) and elementary education (□=16.64). The most often indicated length of student teaching was 12 weeks for agricultural education majors and 16 weeks for all other areas. One of the biggest areas of concern about agricultural education is that student-teaching is relatively short when compared to other preservice teacher education areas. Teacher educators appeared to be conducting adequate number of supervisory visits to student-teachers. The mean number of visits was 3.77 and they lasted an average of 5.44 hours. With the recent push for reform in teacher education, almost half of the teacher education programs in agriculture were anticipating making changes in the programs in the near future. Theses changes included increasing the G.P.A. for admission to teacher education and the length of student-teaching.

Implications

As teacher education in agriculture addresses proposed reform measures it is important to be aware of the characteristics of existing programs. Teacher educators should conduct regular discussion sessions on standards for all aspects of the teacher preparation program. Within the past two years the American Association for Agricultural Education's Program Improvement Committee has been addressing this issue of standards and potential accreditation of teacher education programs.

Linkages should be developed between the standards identified by the AAAE Program Improvement Committee and standards for teacher education established by the National Council for Accreditation of Teacher Education (NCATE), the Interstate New Teacher Assessment and Support Consortium (INTASC) and the National Board of Professional Teacher Standards (NBPTS). Each teacher education program in agriculture should evaluate their preservice program to make sure they are meeting these accepted standards.

The professional association for teacher educators in agriculture, the American Association for Agricultural Education, needs to play a more active role in facilitating discussion about the organization of teacher education programs in agriculture. These discussions could focus on pedagogical and technical knowledge required by future secondary agriculture teachers, the nature of field-based experiences students receive prior to student-teaching, and finally the nature and length of the student-teaching experience, including supervisory and evaluation procedures.

The AAAE should also establish a regular forum at professional meetings to examine the latest teacher education reform efforts and identify ways the profession can prepare for these changes in order to be in a better position to prepare future agricultural education teachers.

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The Influence of Peer Teaching and Early Field Experience on Teaching Efficacy Beliefs of Preservice Educators in Agriculture

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Abstract

Agricultural teacher educators continue to face the problem of retention and recruitment of teachers who teach agriculture in public schools. In an effort to improve the preparation of teachers in agricultural education, this study was framed conceptually that the recruitment and retention of agricultural educators could be influenced by their teaching efficacy beliefs. Teaching efficacy is the belief that teachers have in their "capacity to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233) and they are motivated to exert effort to overcome difficulties (Woolfolk, 2001).

Teacher efficacy provides a promising future to help teachers, especially novices, be more successful in their teaching experiences. Teacher efficacy has been shown to be a powerful construct related to student outcomes such as achievement, motivation, and sense of efficacy (Ashton & Webb, 1986; Guskey & Passaro, 1994; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Moreover, teachers' sense of efficacy has been related to teachers' aspiration, planning and organization, persistence, resilience, enthusiasm, and commitment to teaching and their careers (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).

Although teaching efficacy beliefs are difficult to change once they are established (Woolfolk Hoy, 2000), some researchers have found that teaching efficacy beliefs change throughout the teacher preparation program and through the first year of teaching (Hoy & Woolkfolk, 1990; Spector, 1990; Woolfolk Hoy, 2000). Bandura (1997) purported that there are four sources that influence efficacy beliefs: mastery experience, physiological arousal, vicarious experience, and verbal persuasion. The purpose of this exploratory study was to investigate the influences of peer-teaching and early field experience on the personal and general teaching efficacy of preservice educators during their first year of professional studies in agricultural education.

This pre-experimental study used two intact groups of students enrolled in a foundations of agricultural education course during the spring and autumn quarters of 2000. In the spring cohort, students' personal and general teaching efficacy did not increase significantly after peer teaching. In the autumn cohort, students' personal and general teaching efficacy did not increase significantly after their early field experience. However, the students' personal teaching efficacy did significantly increase after peer teaching for the autumn students, whereas their general teaching efficacy did not increase significantly after early field experience. Although this study raised some interesting questions for further investigation, the conclusions should be interpreted with caution because of uncontrolled extraneous variables related to history or maturation.

Introduction and Theoretical Framework

Effective agricultural education teachers are motivated and confident in their teaching abilities (Miller, Kahler, & Rheault, 1989). Teachers have greater job satisfaction when they believe they can teach and foresee that they can have positive impacts (Hoy & Miskel, 2001). Confidence and satisfaction appear to be related to important teacher affective reactions. For example, past studies have found that personal achievement and feelings of satisfaction were critical to whether beginning teachers remained in or left the teaching profession (Henderson & Nieto, 1991). Beginning agricultural education teachers were stressed, (Joerger & Boettcher, 2000), quiet, reserved, and hesitant to act (Mundt, 1991). Further, beginning agriculture teachers had low self-esteem, low self-confidence (Mundt), and low morale (Henderson & Nieto). Beginning teachers believed that events related to control, student respect, self-confidence, personal satisfaction, and student success had a major impact on teaching (Joerger & Boettcher). Therefore, the literature suggests that motivated teachers who have higher teaching efficacy are more likely to remain in the profession.

Retention of teachers is not the only concern in the profession. Agricultural educators have long been concerned with why agricultural education graduates do not enter the teaching profession (Camp, 1987). Nearly half of the agricultural education graduates in Ohio (Baker & Hedges, 1991), one-tenth (Garton & Cartmell, 1999) to one-third (Birkenholz, 1986) in Missouri, and 28% in Florida (McGhee & Cheek, 1990) did not become agricultural educators in public schools. Some researchers suggest various reasons why agricultural education graduates do not teach in public schools. Baker & Hedges (1991) found that agriculture teachers who entered the teaching profession earned higher grades in their professional courses and student teaching experiences, which suggests that preservice teachers who do better in the teacher preparation program are more likely to teach in public schools. Furthermore, teachers require more and better preparation than ever before (American Council on Education, 1999). Specifically, agricultural education needs to examine and reform its undergraduate program (National Research Council, 1988).

In an effort to improve the preparation of teachers in agricultural education, this study was framed conceptually that the recruitment and retention of agricultural educators could be influenced by their teaching efficacy beliefs. Because beliefs, expectations, and perceptions influence how teachers learn to teach (Borko & Putnum, 1996; Smylie, 1988), teacher efficacy has become an important construct in teacher education and teacher educators should continue to explore how teacher efficacy develops and how they can help preservice teachers develop high teacher efficacy (Pajares, 2000). Teacher efficacy provides a promising future to help teachers, especially novices, be more successful in their teaching experiences. Teacher efficacy has been shown to be a powerful construct related to student outcomes such as achievement, motivation, and sense of efficacy (Ashton & Webb, 1986; Guskey & Passaro, 1994; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Moreover, teachers' sense of efficacy has been related to teachers' behavior, effort, goals, aspiration, openness to new ideas, innovation, planning and organization, persistence, resilience, reluctance to use of criticism, enthusiasm, willingness to work with difficult students, and commitment to teaching and their careers (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).

The theoretical framework of this study was teacher efficacy. Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) defined teacher efficacy as "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 233), and the teachers' motivation to persist when faced with setbacks and their willingness to exert effort to overcome difficulties (Woolfolk, 2001). Teacher efficacy had its genesis from Rotter's (1966) social learning theory with the Rand studies (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). These early studies found that teachers determined the reinforcement of their actions through an internal or external locus of control. Moreover, Bandura (1997) identified teacher efficacy as a type of self-efficacy related to his social cognitive theory that has two expectations: efficacy expectation and outcome expectation. Perceived self-efficacy is typically a stronger predictor of behavior than outcome expectation or locus of control (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).

Teacher efficacy has been most widely measured with Gibson and Dembo's (1984) Teacher Efficacy Scale. The dichotomous measurement was developed based on the two concepts of Bandura's (1997) social cognitive theory. Personal teaching efficacy (PTE) measures efficacy expectancy. PTE is more intrinsic in nature and relates to an "I can" orientation (Guskey & Passaro, 1994). General Teaching Efficacy (GTE) measures outcome expectancy. GTE is more external in nature and relate to an "I can't" orientation.

Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) developed a model (see Figure 1) of teacher efficacy based on an extensive review of the literature. Teacher efficacy develops from a

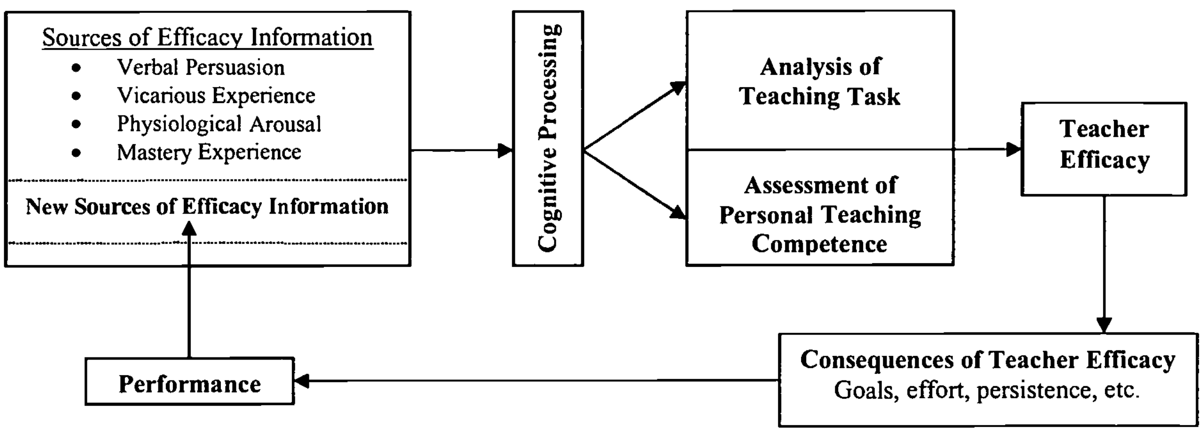

Figure 1. Tschannen-Moran, Woolfolk Hoy, and Hoy's (1998) model of teacher efficacy.

complex process of self-persuasion (Bandura, 1997). The sources of efficacy are inter-related and typically, they are not single sources of efficacy (Bandura, 1997). The four sources of efficacy are: mastery experience, vicarious experience, verbal persuasion, and physiological and affective coping (Bandura, 1997). Efficacy is a product of the cognitively processing information from the four sources of efficacy (Bandura, 1997). The heart of the model is when a teacher analyzes the specific task that will be taught in a specific context and his or her assessment of teaching competence related to the task and context (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). The development of teacher efficacy is cyclical. Information from the four sources that are perceived and interpreted positively helps the teacher feel more competent in organizing and executing the courses of action of the specific task in a particular context which leads to greater motivation, efforts, goals, persistence, and performance. Positively perceived and interpreted information from the performance helps the teacher develop a stronger belief in his or her teaching competence related to the task and context. This cycle can also lead to lower teaching efficacy if the teacher perceives, processes, and interprets the information from the four sources of efficacy in a negative manner. Teacher efficacy influences human functioning and performance (Bandura, 1997). Efficacy beliefs become more stable over time and are rarely changed unless the teacher is faced with compelling evidence to change (Bandura, 1997). Saklofske, Michaluk, and Randhawa (1988) found that preservice teachers with higher teaching efficacy had higher teaching performance. Consequently, helping teachers develop a strong sense of efficacy early in their careers could potentially have long-term dividends to them and their students throughout their teaching careers.

Several studies reported salient conclusions regarding teacher efficacy in the development of preservice teachers. First, there appears to be a difference in the development of personal teaching efficacy and general teaching efficacy. Personal teaching efficacy increased throughout the teacher preparation program and through the first year of teaching (Housego, 1992; Woolfolk Hoy, 2000). Whereas, general teaching efficacy rose during teacher preparation but then it declined after student teaching (Hoy & Woolkfolk, 1990; Spector, 1990; Woolfolk Hoy, 2000). Therefore, general teaching efficacy appears to be more sensitive to external factors when teachers are immersed in real teaching situations. Second, the support for beginning teachers influences teaching efficacy. Woolfolk Hoy (2000) suggested that teaching efficacy declined after support for the beginning teacher was withdrawn. Therefore, mentors and teacher educators wrestle with the degree of support they should provide to enable preservice teachers to develop autonomous competence.

Teacher educators have struggled for a long time over the issues of what teachers should know and what environments would create meaningful learning (Putnam & Borko, 2000). Preservice teachers typically learn how to teach in more controlled, structured classrooms on campus and in real, natural classrooms through field-based experiences (Putnam & Borko, 2000). Experience, both positively and negatively, influenced the teaching efficacy beliefs of preservice science teachers (Watters & Ginns, 1995). Although field-based experiences are important in preparing teachers, on-campus laboratory-based programs are also important in developing teachers (Metcalf, Hammer, & Kahlich, 1996).

Understanding the construct of teaching self-efficacy of prospective and beginning teachers as they develop beliefs, attitudes, and teaching skills in teacher education programs is important to the future of the agricultural education profession. Few researchers have studied the interactions and relationships of teacher efficacy and the various components of teacher preparation in agricultural education. Rodriquez (1997) completed a dissertation on teacher efficacy in agricultural education using early field experience preservice teachers, student teachers, first-year teachers and second-year teachers in agricultural education. Although his finding was not statistically significant, student teachers had the highest teaching efficacy and 2nd-year teachers had the lowest teaching efficacy (Rodriquez, 1997). Further, all groups had higher personal teaching efficacy than general teaching efficacy.

In some studies related to teaching efficacy, Deeds and Barrick (1986) found that preservice teachers' attitudes toward teaching as a career or themselves as teachers did not change significantly after a 3-week early field experience. Joerger and Boettcher (2000) found that novice agriculture teachers were moderately confident and felt that a teacher's confidence had a major impact on their success as a beginning teacher. Mundt (1991) found that novice agriculture teachers lacked confidence and expressed feelings of loneliness, isolation, frustration, and stress. Grady's (1990) career mobility study supported Bandura's social cognitive theory. Grady stated that a person's feelings, attitudes, and behaviors influence their confidence as a teacher. Although the construct of teacher efficacy has revealed promising findings in the field of education, there remains a need for further research in building the body of knowledge for a more clearly defined and structured construct. Therefore, this study was conducted because teacher efficacy is situation specific, including context and subject matter, and thereby teaching efficacy needed to be investigated in agricultural education.

Purpose and Objectives

The purpose of this exploratory study was to investigate the influences of peer-teaching and early field experience on the personal and general teaching efficacy of preservice educators during their first year of professional studies in agricultural education. The four research questions for this study were:

1. Will students score significantly higher on personal teaching efficacy after peer teaching?
2. Will students score significantly higher on general teaching efficacy after peer teaching?
3. Will students score significantly higher on personal teaching efficacy after the early field experience?
4. Will students score significantly higher on general teaching efficacy after the early field experience?

Methods and Procedures

A one-group pretest-posttest design using two intact groups was used for this pre-experimental study. The accessible population of this study was undergraduate students in two intact groups enrolled in a foundations course in agricultural education at a large Midwestern land-grant university. This study was a census of all undergraduate students enrolled in the foundations course in 2000. Forty-three students were enrolled in the foundations course during the Spring, 2000 quarter and 44 students were enrolled in the Autumn, 2000 quarter. Seventy-three students completed the Teacher Efficacy Beliefs Questionnaire during the early field experience orientation, resulting in an eighty-four percent response rate. Because a convenient population was used, the researcher cautions that the findings and conclusions of this study should not be generalized beyond the accessible population of this study.

Students in the course were mostly sophomores and juniors pursuing three career options in agricultural education: (a) teaching certification, (b) extension education, or (c) agribusiness education and training. This was the first professional education course for students with a major or minor in agricultural education. Students self-selected their enrollment in the course and random assignment of students to the course sections or the treatments were not possible. Each section of the foundations course met for 108 minutes twice a week and was taught using interactive video technology in a distance education environment between a classroom at the main campus and a classroom at a branch campus. The course content of the course included: (a) ten days of early field experience in public schools or county extension offices, (b) history, philosophy, and careers related to agricultural education, and (c) psychology and sociology related to agricultural education.

There were two treatments conducted: X_1 = peer teaching, and X_2 = early field experience:

Spring Group (*N* = 43): O X_1 O
Autumn Group (*N* = 44): O X_2 O X_1 O

For the early field experience, students completed an application for placement in a public school agricultural education program or a county Extension office throughout the state. The students were placed in the order the applications were received. Then, the students attended an orientation to learn about the responsibilities and assignments of the early field experience. Cooperating educators were also sent correspondence of their responsibilities. The length of the early field experience was 10 days with an agricultural education teacher or 80 hours with a county Extension agent during the summer of 2000. The students completed collected information, made observations, and assisted their cooperating educator with teaching or facilitating responsibilities. Although each early field experience varied depending on the situations of the placement site and the cooperating educators' style, the summated mean scores for personal and general teacher efficacy should have minimized the differences among the early field experience sites. However, location for this treatment could be considered a threat to internal validity.

One section was taught during the spring quarter and the other was taught during the autumn quarter. The students were instructed how to plan for and conduct the four peer-teaching activities for the last five weeks of the term related to the psychological and sociological content portion of the course. The four peer-teaching activities were: discussion, application, synthesis, and reflection. The topics were chosen by the instructor from the textbook, Educational Psychology (Woolkfolk, 2001). Teams of four to five students conducted the discussion and application activities. The instructor assigned to students to teams using random blocking based on temperament (Kiersey, 1998). Each group rotated through the two in-class teaching activities—discussion and application—and the two out-of-class teaching activities—synthesis and reflection. The spring course section did their synthesis teaching activity during class. Each group was responsible to teach the assigned topics using the assigned teaching activity. Further, every student had to share a speaking part to be evaluated by the instructors. The class schedule for peer teaching was: 10:00 minutes for the introduction and interest approach by the instructor; 50:00 minutes for the discussion by a peer group; 5:00 minutes for a break and to switch groups; 30:00 minutes for application by a student group; and, 13:00 minutes for the summary by the instructor. The synthesis teaching activity was posted on an electronic bulletin board using Web Course Tools. The reflection activity was a self-evaluation that was sent to the instructor via private electronic mail after each student taught in the discussion and application activities.

Students were given the pretest at the early field experience orientation using the Teacher Efficacy Scale. The researcher adapted the items used in the instrument from Woolfolk & Hoy's (1990) short-version of Gibson and Dembo's (1984) Teacher Efficacy Scale. The wording of the items were adapted to be relevant to preservice agricultural educators in formal (public schools) and non-formal (Extension and business/industry) settings. The questionnaire contained 31 items related to beliefs about personal teaching efficacy and general teaching efficacy. Efficacy beliefs were measured using a 6-point summated rating scale. Students were asked to respond to each statement using the following rating scale: Strongly Disagree (1), Moderately Disagree (2), Slightly Disagree (3), Slightly Agree (4), Moderately Agree (5), and Strongly Agree (6). Initially, the Teacher Efficacy Scale was pilot- and field-tested to establish content and construct validity by Gibson and Dembo (1984). Woolfolk and Hoy (1990) conducted further construct validity using factor analysis to suggest that Gibson and Dembo's 30-item scale could be reduce to 10 items, known as the Short Version—Teacher Efficacy Scale.

Construct validity was also established using factor analysis statistics to analyze the data sample as recommended by Woolfolk & Hoy (1990). Five items loaded (.627 to .785) on the personal teaching efficacy factor and the other five items loaded (.585 to .783) using the principal components varimax method, which explained 48 percent of the variance. Further, a panel of experts on teaching and learning in agriculture in the department established content and face validity because of the slight word changes in some of the items. The estimates of reliability, using Cronbach's alpha, were 0.76 for the five items related to personal teaching efficacy and 0.78 for the five items related to general teaching efficacy. Negatively worded items were reverse coded prior to analyzing the data. The data set was analyzed using SPSS. Summated means and standard deviations were calculated for the composite scores of personal teaching efficacy and general teaching efficacy. The pretest mean of the two intact groups was not significantly different ($p < .001$) for personal teaching efficacy; however, the pretest mean of the two groups was significantly different ($p = .045$) on general teaching efficacy. The data met the assumptions of normality, homogeneity of variances, and independence for dependent *t*-tests. Descriptive statistics and paired samples *t*-tests were conducted to test for significance. Directional tests and alpha (□ = .05) were set *a priori*. The results and conclusions should be interpreted within the context of this study because of the researcher used intact groups and did not control for extraneous variables related to maturation, history, and testing.

Results and Findings

At the outset, the students in the spring and autumn groups agreed they were moderate for personal teaching efficacy and were indifferent to slight agreement for general teaching efficacy. The spring group (Table 1) had a personal teaching efficacy of 4.43 (σ =.65) and a general teaching efficacy of 3.71 (σ =.87) for the pre-test measurement. Their personal teaching efficacy was 4.60 (σ =.61) after the peer-teaching treatment, and it did not increase significantly. The spring group of students' general teaching efficacy was 3.74 (σ =.79) after the peer-teaching treatment, and it did not increase significantly. Therefore, students in the spring group did not score significantly higher on personal teaching efficacy (Research Question 1) or on general teaching efficacy (Research Question 2) after peer teaching.

The autumn group (Table 2) had a personal teaching efficacy of 4.44 (σ =.63) and a general teaching efficacy of 3.32 (σ =.78) at the time of the pretest measurement. Their personal teaching efficacy was 4.54 (σ =.74), which did not increase significantly after the early field experience. The autumn students' general teaching efficacy was 3.51 (σ =.93), which did not increase significantly after the early field experience. Therefore, the early field experience did not increase the students' personal teaching efficacy (Research Question 3) or general teaching efficacy (Research Question 4).

Table 1. Descriptive Statistics and Tests of Significance for Spring Quarter Students

Peer-Teaching Treatment	*N*	Pre-test μ (σ)	Post-test μ (σ)	*t*	*p*
Personal Teaching Efficacy	34	4.43 (.65)	4.60 (.65)	1.64	.055
General Teaching Efficacy	34	3.71 (.87)	3.80 (.74)	.83	.205

Note. Scale: 1 = Strongly disagree, 2 = Moderately disagree, 3 = Mildly disagree, 4 = Mildly agree, 5 = Moderately Agree, 6 = Strongly agree.
*p<.05 (one-tail)

Table 2. Descriptive Statistics and Tests of Significance for Autumn Quarter Students

Early Field Experience Treatment	*N*	Pre-test μ (σ)	Post-test μ (σ)	*t*	*p*
Personal Teaching Efficacy	39	4.44 (.63)	4.54 (.74)	.89	.190
General Teaching Efficacy	39	3.32 (.78)	3.51 (.93)	1.28	.104

Note. Scale: 1 = Strongly disagree, 2 = Moderately disagree, 3 = Mildly disagree, 4 = Mildly agree, 5 = Moderately Agree, 6 = Strongly agree.
*p<.05 (one-tail)

The autumn group (Table 3) of students' personal teaching efficacy was 4.52 (σ =.76) and their general teaching efficacy was 3.48 (σ =.92) on the pretest prior to the peer-teaching treatment. The students' personal teaching efficacy was 4.74 (σ =.58) after the peer teaching treatment. This increase in personal teaching efficacy was significant (p=.008). The autumn students' general teaching efficacy was 3.64 (σ =.84), which did not increase significantly after the peer-teaching treatment. Therefore, the autumn students' personal teaching efficacy did increase significantly after peer teaching (Research Question 1), but their general teaching efficacy did not increase significantly after peer teaching (Research Question 2).

Conclusions, Implications, and Recommendations

Prospective agricultural, extension, and agribusiness educators in their foundations course in agricultural education moderately agreed with the items related to personal teaching efficacy. They were indifferent to being in slight agreement with the items related to general teaching efficacy. The spring students did not report a significant increase in personal and general teaching efficacy after they taught each other through the peer teaching activities—discussion, application, synthesis, and reflection—during the foundations in agricultural education course. The autumn students did not report a significant increase in personal and general teaching efficacy after they conducted their ten days or eighty hours of early field experience in a public school or county Extension office.

Table 3. Descriptive Statistics and Tests of Significance for Autumn Quarter Students

Peer-Teaching Treatment	*N*	Pre-test μ (σ)	Post-test μ (σ)	*t*	*p*
Personal Teaching Efficacy	43	4.52 (.76)	4.74 (.58)	2.51	.008*
General Teaching Efficacy	43	3.48 (.92)	3.64 (.84)	1.39	.086

Note. Scale: 1 = Strongly disagree, 2 = Moderately disagree, 3 = Mildly disagree, 4 = Mildly agree, 5 = Moderately Agree, 6 = Strongly agree.
*p<.05 (one-tail)

In addition, the autumn students reported a significant increase in personal teaching efficacy after they completed the peer teaching activities in the foundations course, yet they did not report a significant increase in general teaching efficacy after they completed they taught their peers. Tenably, the difference between spring and autumn students could be that the autumn students grew more when they conducted peer teaching activities in a structured on-campus classroom following field experiences in real teaching situations that gave them relevant teaching experience. This conclusion should be interpreted with caution because this increase in personal teaching efficacy of the autumn students could have occurred due to history or maturation. Further, although the spring group was not measured after they completed the early field experience, it would be imperative to compare their teaching efficacy to the autumn students to determine if their personal teaching efficacy increased significantly after both treatments.

It is interesting to note that peer teaching significantly increased personal teaching efficacy after students had completed the early field experience. This could imply that students become more efficacious in their teaching after they have observed and experienced teaching in a natural setting. Further, these findings support that teachers should be developed in field-based and on-campus laboratory settings (Metcalf et al., 1996; Putnam & Borko, 2000). Furthermore, it is plausible to conclude that students in this foundations of agricultural education course exhibit greater teaching efficacy when they believe they can make a difference with their teaching skills (personal teaching efficacy) than they would when they feel they have less control over the learning situation due to family, parental, and community influences on their learners (general teaching efficacy).

The increase in personal teaching efficacy of the autumn students after peer teaching supports other studies that teaching experience increases teaching efficacy (Rodriquez, 1997; Woolfolk Hoy, 2000). However, the findings that peer teaching and early field experience alone did not increase teaching efficacy is also congruent with some researchers. Hoy and Woolfolk (1990) found that although personal teaching efficacy increased and general teaching efficacy fell during the student teaching experience. Therefore, the nature of the subjects in this study should be considered because this course was the first teaching experience for many of the students. Initial teaching and field-based experiences can cause stress and anxiety for novices (Woolfolk Hoy, 2000).

The findings of this study can also be explained in part with Bandura's (1997) self-efficacy theory. Bandura's four sources of efficacy—mastery experience, physiological arousal, vicarious experience, and verbal persuasion—contributed to the students growth in personal teaching efficacy through their peer teaching activities in the foundations course after their early field experience. Teacher efficacy is more likely to be influenced by a combination of sources rather than a single source (Bandura). It appears that the students benefited more from peer teaching after they gained real-life experience in the field. The combination of early field experience and teaching peers in a more controlled environment probably contributed more to the students' personal teaching efficacy because they felt a sense of mastery after they were instructed how to teach in the course. The early field experience and peer teaching events should have contributed to the development of teacher efficacy assuming that the preservice teachers felt supported by a mentor or experienced educator. However, the brevity of the early field experience and peer teaching events may not have provided a sustained, supportive experience for teacher efficacy to grow significantly.

The findings of this study are also congruent with other researchers who agree the teaching efficacy is complex and difficult to measure and understand (Tschannen-Moran, 2000; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Watters & Ginns, 1995). Although the peer teaching activities and early field experiences can be sources of teaching efficacy, it appears that students may get limited mastery and vicarious experiences in teaching two activities over five weeks or a few days during their ten days of early field experience. Support and guidance (Woolfolk Hoy, 2000; Watters & Ginns, 1995) from cooperating educators during the early field experience can also be a source of teaching efficacy, however, this variable not controlled for or measured.

Due to the exploratory purpose of this study, the findings may inform agricultural educators to consider the variables related to the teacher development process of beginning educators. Teacher educators should consider developing preservice teachers through a combination of peer teaching activities in a more controlled environment and in a more contextually-rich teaching environment through field-based experiences. Further, teacher educators and cooperating educators should consider the sources of teacher efficacy when interacting with and mentoring prospective agricultural and extension educators. Teacher educators, cooperating educators, and supervisors should design learning opportunities for preservice educators to gain mastery experience, learn vicariously, receive constructive feedback and coaching, and control their physical emotions.

This exploratory study raised some important questions that need to be investigated using quasi-experimental designs for greater internal validity. A non-equivalent control group should be used to determine the effects and interaction of various treatments in developing prospective agricultural educators. Moreover, it is recommended that longitudinal trend studies be conducted to chart the development of teacher efficacy beliefs over several years of the undergraduate studies and the beginning years of educators. Furthermore, qualitative-interpretivist inquiry should be conducted to understand the development of teacher efficacy, its sources of growth, and its sources of decline. Future studies should also be conducted to determine how teacher characteristics, collective efficacy, and organizational variables influence the development of teacher efficacy beliefs.

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The Use of Teacher Certification Measures in Predicting Secondary Agriculture Instructors' Teaching Performance

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Abstract

The purpose of this study was to assess the ability of teacher preparation program certification requirements to predict classroom teaching performance. The accessible sample consisted of 12 Agricultural Education graduates. Teaching performance was assessed by the teacher's supervising administrator using the Performance Based Teaching Evaluation instrument, and by the researcher through classroom observations using the Formative Assessment of Teaching instrument.

The first research objective sought to describe the teacher certification requirements that were predictive of teaching performance during the initial years of teaching as assessed by the teachers' administrative supervisors. Agricultural education coursework GPA accounted for 40% of the variance associated with teaching performance, as assessed by public school administrators. The second research objective sought to describe the teacher certification requirements that were predictive of observed classroom teaching performance. Upon regressing the dependent variable, teaching performance, on the seven certification measures, no certification measure, or combination of certification measures, were found that could explain a significant proportion of the variance in teaching performance. Research objective three sought to describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching performance. Administrators, in face-to-face interviews, emphasized the importance of affective characteristics to teaching. Administrators perceived that higher academic abilities did not necessarily equate to successful teaching performance.

Introduction/Theoretical Framework

Developing quality teachers for public schools has been, and continues to be, the goal of teacher education programs in universities and colleges across the United States. The issue of teacher quality is not a new phenomenon. From the early beginnings of formalized teacher education, there have been issues dealing with the recruitment and development of qualified individuals to teach in the public schools. As early as 1750, Benjamin Franklin noted the colonies were "suffering at present very much for want of good schoolmasters" (Lucas, 1997, p.7).

More recently, during the 1970s and 1980s, research confirmed public perception that teachers lacked basic competency skills, and that admission and certification standards into teacher preparation programs were lax (Lucas, 1997; Lyons, 1980; Weaver, 1979). Lyons stated, "Teacher education is a massive fraud. It drives out dedicated people, rewards incompetence, and wastes millions of dollars" (p. 108). Weaver, when discussing the ramifications of the 'education brain-drain' stated, "Schools of education are now selecting potential educators from among the least academically talented populations applying for college admission" (p. 30).

Reports produced throughout the 1980s, such as A Nation at Risk (1983) and A Nation Prepared: Teachers for the 21st Century (1986), perpetuated the perception of teachers being academically challenged, and led to the exponential growth in the types of admission and certification measures used in teacher education programs. Yet research found preservice teachers to be as academically qualified as students in non-teaching majors (Abel & Pool, 1990; Barger, et al., 1988). By the late 1980s, admission criteria into teacher preparation programs were found to be as stringent as admissions into engineering, pharmacy, business administration, and other professional degree areas (Lucas, 1997).

Because of the increased requirements for admission and certification placed upon preservice teachers, a burden of accountability to recruit and maintain high quality preservice teacher candidates has been placed on teacher preparation programs and their faculty. Yet a number of these standardized measures for admission and certification are repetitive (Dybdahl, Shaw & Edwards, 1997) and do not accurately predict teaching performance (Daniel, 1993; McCutcheon, Schmidt, & Bolden, 1991; Olstad, et al., 1987; Pigge & Marso, 1989; Riggs & Riggs, 1990; Salzman, 1989, 1991; Villeme, et al., 1982; Wakeford, 1988; Williams & Wakeford, 1990).

Since the increase in use of, and dependence on, academic measures in teacher preparation, researchers have sought to ascertain the ability of the various tests to accurately select individuals that will become successful teachers. Whereas academic assessments have been found to be good predictors of future performance on standardized tests (Villeme, 1982; Wakeford, 1988; Williams & Wakeford, 1990), little conclusive evidence has been found linking admission, retention, and certification measures to teaching performance.

One criterion extensively used as an admissions and retention measure in teacher preparation programs has been student grade point average (GPA). Research findings have been mixed as to the predictive potential of GPA. Some researchers (Daniel, 1993; Pigge & Marso, 1989; Riggs & Riggs, 1992) found GPA to be a good predictor of student teaching performance and classroom teaching performance. Other researchers (McCutcheon, Schmidt, & Bolden, 1991; Olstad et al., 1987) found that GPA had no predictive capability toward student teaching performance. The lack of consistent findings in regard to student GPA leaves questions as to its use as a selection criterion in teacher preparation.

Furthermore, prior research has focused on the relationship of admission, retention, and certification criteria to future preservice teacher performance. Guyton and Farohki (1987) in examining certification requirements as predictors of a teacher's classroom performance found no significant relationship between performance on a subject matter test and teaching behaviors. Pigge and Marso (1989) studied the ACT examination and Comprehensive Test of Basic Skills as predictors of student teaching performance, finding neither exam related to student teaching performance. Riggs and Riggs (1990) examined the California Basic Educational Skills Test and the National Teachers Examination (NTE), finding the scores non-significant in predicting student teacher performance.

Dybdahl, Shaw, and Edwards (1997) found the Pre-Professional Skills Test (PPST) to have no relationship to measures of teacher preparation program success, and Salzman (1989, 1991) determined the PPST and National Teachers Examination (NTE) to be weak predictors of student teaching performance. Daniel (1993) investigated the ACT and components of the NTE exam as predictors of student teacher performance, finding them to be poor predictors of teaching behaviors.

Whereas the previously noted studies have focused primarily on relationships between admission criteria and the student teaching practicum, few studies have been conducted that examine the complete continuum from admission to career. In a comprehensive study, Heller and Clay (1993) found that grade point average and NTE-PK (professional knowledge) had a limited ability to predict teaching effectiveness. Nevertheless, many colleges of education across the country continue to utilize academic measures as gatekeeping and retention factors in teacher preparation.

Selecting and preparing qualified individuals to fill teaching vacancies has become a growing concern throughout colleges of education. The use of academic measures to select teacher candidates, while a convenient means of assessing cognitive ability, potentially does not address the broader concern of selecting effective teachers.

Colleges of education continually strive to improve the quality of students entering and completing teacher preparation programs. The use of academic measures of achievement in teacher education has come in response to public and political pressures for more accountability in education. The use of standardized tests, however, may potentially be causing a reverse effect by creating a relatively small homogeneous population of prospective teachers with good test-taking abilities, but who may or may not be effective classroom teachers.

It is the goal of admission committees to use criteria that have the best prediction potential for future teaching effectiveness. Admission and certification decisions need to be based on evidence of predictability for future teaching performance. The currently used admission, retention, and certification criteria used in teacher preparation programs require further investigation to determine if they are good predictors of future teaching performance.

Purpose/Objectives

The purpose of this study was to assess the ability of teacher preparation program certification requirements to predict classroom teaching performance. Specifically, the study examined the ability of certification requirements employed by the College of Education at the University of Missouri to predict teaching performance of teachers certifying in agriculture. The following research objectives were developed to guide the study:

1. Describe the teacher certification requirements, or combination of requirements, that were predictive of teaching performance, as assessed by administrative supervisors during the initial years (first and second) of teaching.
2. Describe the teacher certification requirements, or combination of requirements, that were predictive of observed classroom teaching performance during the second year of teaching.

3. Describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching performance.

Methods/Procedures

The target population for the study was Agricultural Education graduates who were certified to teach through the University of Missouri. The accessible sample consisted of (6) male and (6) female (n = 12) secondary agriculture teachers who completed teacher certification in 1999. The teachers had completed one year of teaching secondary agriculture, and were engaged in their second year of teaching. Nine of the 12 teachers remained in the same school as their initial year of teaching. Three teachers had changed schools after one year of teaching.

To conduct the study, a total of nine variables were selected (Table 1). Seven variables used by the College of Education were categorized as Teacher Certification Requirements and acted as independent variables (predictor variables). Teaching performance, as assessed by the supervising administrator and the researcher during the second year of teaching, acted as the dependent variables for objectives one and two respectively. For this study, supervising administrators were identified as the high school principals.

Table 1

Variables by Category

Teacher Certification Requirements	Teaching Performance
1. ACT Examination	1. Administrative Supervisor Assessment of Teaching
2. Education GPA	2. Researcher Observed Assessment of Classroom Teaching Performance
3. Agricultural Education GPA	
4. Content Area GPA	
5. Cumulative GPA	
6. NTE Praxis - Specialty Area	
7. C-BASE Examination	

Assessment of the teachers' teaching performance was conducted by supervising administrators using the Performance Based Teaching Evaluation (PBTE) instrument. The PBTE instrument consisted of four performance areas: (a) The Instructional process (nine subcategories), (b) Classroom Management (two subcategories), (c) Interpersonal Relationships (three subcategories), and (d) Professionalism (three subcategories). The assessment utilized a Likert-Type scale of one to six. Guidelines established by the College of Education to complete the PBTE were: a score of one to two equaled Below Expected Performance, scores of three to four equaled Expected Performance, and scores of five to six equaled Above Expected Performance.

Validity of the PBTE instrument was previously assessed by the College of Education through use in evaluating student teaching performance. No test of reliability was documented by the College of Education. A reliability analysis was conducted by the researcher to address the issue of internal consistency. For this analysis, 23 PBTE instruments completed by supervising agriculture teachers during the 1998 and 1999 student teaching internships were used. Internal consistency of the 17 assessment items yielded a Cronbach's alpha value of .95.

The Formative Assessment of Teaching instrument was used to assess the agriculture teacher's classroom teaching performance. One classroom visitation and two follow-up teaching video tapes, developed by the agriculture teachers, were evaluated using the Formative Assessment of Teaching instrument. This instrument was developed and utilized by faculty in the Department of Agricultural Education to assess student teacher performance. The instrument evaluated a teacher's instructional process and teaching performance. The assessment utilized a Likert-Type scale of one to six. Guidelines to assess teaching performance were: One to two equaled Below Expected Performance, three to four equaled Expected Performance, and five to six equaled Above Expected Performance. The instructional process section of the instrument assessed a teacher's performance in the following eight areas: (a) Establishing Set, (b) Stating Lesson Objective, (c) Providing Input, (d) Checking for Comprehension, (e) Modeling Ideal Behavior, (f) Providing Guided Practice, (g) Providing Independent Practice, and (h) Achieving Closure. The performance criteria section of the instrument was based upon the Rosenshine and Furst (1971) effective teaching characteristics, and evaluated a teacher's teaching performance on the following seven areas: (a) Preparation, (b) Clarity, (c) Variety, (d) Enthusiasm, (e) Task-Oriented, (f) Opportunity to Learn, and (g) Students and the Learning Environment.

Validity of the Formative Assessment of Teaching instrument had previously been established by faculty in the Department of Agricultural Education. To determine intra-rater reliability, a coefficient of stability was calculated by re-evaluating the video tapes 30 days following the initial on-site observation. Coefficients of stability were .95, .90, and .96 respectively for section I (Instructional Process), section II (Performance Criteria) and the overall total on the instrument.

To address objective three, personal interviews were conducted with supervising administrators. The purpose of these interviews was to ascertain the administrator's perceptions as key informants. Interview questions for the key informant interviews were developed by the researcher, and validated by the Agricultural Education faculty. The semi-structured interview involved developing three structured questions that were followed up with probing questions during the interview process.

Results/Findings

The first research objective sought to describe the teacher certification requirements that were predictive of teaching performance during the initial years of teaching as assessed by the teachers' administrative supervisor. The issue of multi-collinearity was addressed using procedures suggested by Lewis-Beck (1980) where each certification measure (independent variable) was regressed on the remaining certification measures. The results of this analysis identified high coefficients of determination (r^2) for ACT composite score (.76), Education coursework GPA (.76), C-BASE English (.84), and C-BASE Written (.74). Based upon the high coefficients of determination, ACT composite score, Education coursework GPA, C-BASE English, and C-BASE Written data were removed from further consideration in the study.

Bivariate correlational analysis revealed substantial (Davis, 1971) positive correlations between teaching performance and agricultural education GPA (r = .68) and cumulative GPA (r = .60) (Table 2). A moderate positive correlation was found between teaching performance and agriculture coursework (r = .39). Low positive correlations were found between teaching performance and C-BASE Social Science (r = .28) and C-BASE Math (r = .14). A low negative correlation was identified between teaching performance and NTE Praxis (Agriculture) (r = -.14), and a negligible negative correlation was found with C-BASE Science (r = -.03).

Stepwise multiple regression analysis was conducted to identify the best certification measure, or combination of certification measures, that were predictive of teaching performance as assessed by supervising administrators (Table 3). The analysis revealed that agricultural education coursework GPA contributed significantly (p = .021) to explaining 40% of the variance associated with teaching performance, as assessed by supervising administrators. The remaining certification measures failed to enter into the regression equation.

Table 2

Intercorrelations between Teaching Performance and Certification Measures

	1	2	3	4	5	6	7	8
1. Cumulative GPA	1.00	.78	.35	.47	.33	-.13	.20	.60
2. Agriculture GPA		1.00	.50	.63	.58	.00	.52	.39
3. Agricultural Education GPA			1.00	.36	.26	-.01	-.01	.68
4. C-BASE Math				1.00	.49	.10	.35	.14
5. C-BASE Social Science					1.00	.69	.46	.28
6. C-BASE Science						1.00	.35	-.03
7. NTE Praxis (Agriculture)							1.00	-.14
8. Teaching Performance								1.00

Table 3

Stepwise Regression of Certification Measures on Teaching Performance

Variable	Adjusted R^2	b	t
Agricultural Education GPA	.40	.68	2.79*
(Constant)		-5.60	

*$p < .05$.

The second research objective sought to describe the teacher certification requirements that were predictive of observed classroom teaching performance. To assess research objective two, data collected from the three teaching observations were combined and converted to a percentage score (Table 4). The mean overall performance was 68.9 (SD = 11.82), compared to a high mean of 71.2 (SD = 11.03) from the on-site observations, and a low mean of 64.7 (SD = 12.37) on the first video taped evaluation.

Table 4

Summative Scores of Teaching Performance of Secondary Agriculture Teachers Measured on the Formative Assessment Instrument

	Instructional Process		Performance Criteria		Overall Assessment	
	M	SD	M	SD	M	SD
On-Site Observation	68.88	11.15	73.62	11.73	71.20	11.03
Video Tape One	64.31	11.44	65.48	14.09	64.79	12.37
Video Tape Two	66.80	12.67	67.46	14.04	67.12	13.09
Combined Scores	67.41	11.38	70.56	13.00	68.93	11.82

Bivariate correlational analysis between teaching performance, as measured by the Formative Assessment instrument and the certification measures, was performed (Table 5). Analysis revealed substantial positive correlations between teaching performance and C-BASE Social Science (r = .54), and agriculture coursework GPA (r = .53), and moderate positive correlations between teaching performance and cumulative GPA (r = .45) and agricultural education GPA (r = .45). A low positive correlation was found between teaching performance and C-BASE Math (r = .19), and a negligible positive correlation with C-BASE Science (r = .07). A negligible negative correlation was found between teaching performance and NTE Praxis (Agriculture) (r = -.01).

Table 5

Intercorrelations between Teaching Performance, as Measured on the Formative Assessment Instrument, and Certification Measures

	1	2	3	4	5	6	7	8
1. Cumulative GPA	1.00	.78	.35	.47	.33	-.13	.20	.45
2. Agriculture GPA		1.00	.50	.63	.58	.00	.52	.53
3. Agricultural Education GPA			1.00	.36	.26	-.00	-.01	.45
4. C-BASE Math				1.00	.49	.10	.35	.19
5. C-BASE Social Science					1.00	.69	.46	.54
6. C-BASE Science						1.00	.35	.07
7. NTE Praxis (Agriculture)							1.00	-.01
8. Teaching Performance								1.00

Stepwise multiple regression analysis was conducted to identify the best certification measure, or combination of certification measures, that were predictive of teaching performance as assessed by the researcher using the Formative Assessment instrument. Upon regressing the dependent variable, teaching performance, on the seven certification measures, no certification measure, or combination of certification measures, were found that could explain a significant proportion of the variance in teaching performance.

Research objective three sought to describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching performance. Three major categories were identified from administrator comments: (a) Teacher Characteristics, (b) Evaluation and Assessment, and (c) Relationship of Cognitive and Affective Characteristics to Teaching Ability.

In addressing teaching characteristics in relation to assessment of teaching performance, supervising administrators discussed the importance of both cognitive and affective traits. Administrator comments relating to Teaching Characteristics were:

> "Teachers that are successful have diverse presentation schemes, and as a result it keeps the students attentive and it keeps the teachers fresh."
> "Organization, planning, being prepared to teach each day is maybe 80% of the ball game."
> "They must be able to articulate ideas and concepts, and be attuned to details."
> "They need to be able to communicate well and with all different levels of learning. You have to be able to communicate or you won't teach the kids anything."
> "They need to be solid in their content area."
> "Caring is very important."
> "You've got to have a desire to work with kids, without a doubt.""They need to . . . present themselves with confidence and self-esteem."
> "I guess they're enthusiastic because they like what they're doing, and they want others to like what they're doing. Those types of teachers motivate kids more easily than the old professorial behind the lectern."
> "Teachers need to . . . have a natural ability to interact in the classroom."

In discussing the Evaluation and Assessment of Teaching Characteristics, supervising administrators noted:

> "There should be an effective screening process that addresses these [affective] characteristics . . ."
> "I do look at academic standards. Are they committed to their subject?"
> "You can look at a person's transcripts and get a reading on how they've done."
> "I just go a lot on my feelings, a lot on the impressions I get just setting and talking and discussing things. More on talking about their interests and things."
> "Questions like 'what did you do in high school?' or 'how active have you been?'"
> "During the interview process, questions are asked that address a teacher's degree of attainment of the necessary qualities."
> "It's very difficult to do it in the interview. I think you can get a feel for the personality of a person."

In discussing the relationships of Cognitive and Affective Characteristics, supervising administrators stated:

> "I know I have, or have had, some teachers that are really brilliant, and top 4.0, the whole nine yards . . . but they don't necessarily make the best teachers."
> "Straight As don't always impress me because the straight A student a lot of times hasn't had to work at things nearly as hard as I have, and it might be difficult for them to teach to someone else. It's [learning] always come natural to them."

"That teacher that was a B average, maybe a C student, had to work a little harder and maybe understands a little more."

"Four-point-0 students often lack rapport with students, especially those that may be struggling or lack motivation to learn. Those individuals typically have had no problems learning, and find it difficult to connect with students who have learning challenges."

"I've seen guys that were brilliant . . . too smart for the kids and couldn't reach them. There's a fine line."

"In general, I would rather have somebody with a 2.5 to 3.5 instead of a 4.0 that's not been involved. They sometimes don't have the communication skills and abilities, or maybe even empathy."

"You can be the smartest person in the world standing up there, and if you can't relate to them [students], they shut you off."

Conclusions/Recommendations/Implications

Agricultural education coursework GPA was the best predictor of teaching performance as assessed by supervising administrators. This finding supports previous research conducted by Guyton and Farokhi (1987) in which a relationship was reported between upper level GPA (closely associated with teacher preparation coursework) and teaching performance. Having knowledge of the potential of agricultural education coursework to predict future teaching performance has implications for the agriculture teacher preparation program. The utilization of coursework GPA in agricultural education as a predictor of teaching ability can be a tool for teacher educators in the guidance of potential agriculture teachers. It should be noted, however, 12 of 29 credit hours associated with agricultural education coursework are accounted for during the student teaching practicum. With student teaching accounting for slightly less than half of agricultural education GPA, this finding should be viewed with some caution. Further, the inability of the other certification measures to account for 60% of the variance associated with teaching performance would also imply that there may be other factors that should be examined as potential means of predicting a teacher's teaching potential. Further research should be conducted to identify the courses and concepts taught in the Agricultural Education program that account for the degree of relationship with administrator assessment. Further studies should also attempt to separate and examine agricultural education GPA in relation to the undergraduate coursework and the student teaching practicum. This would provide further insight into those factors identified and assessed by supervising administrators.

None of the teacher certification measures were predictive of the agriculture teachers' classroom teaching performance, as observed by the researcher. Analysis of the data further revealed that the teachers were on average at or above expected levels of performance. This conclusion would imply that the primary use of the identified certification measures to serve a gatekeeping function in the teacher preparation process for agricultural education students may be unjustified. The inability of the certification measures to predict teaching performance would imply that there may be other factors that could be utilized to more accurately identify individuals who have the potential to become successful agriculture classroom teachers. A further implication is that if this finding is replicated across subject matter areas, teacher educators should question the validity and application of academic certification measures as the sole means of assessing the future teaching potential of preservice teachers.

Based upon the perceptions of the supervising administrators, it can be concluded that cognitive and affective characteristics are important to effective teaching. Supervising administrators identified those traditional abilities of content knowledge and instructional methodology as important, but also noted a caring nature, being people-oriented and self reflective as being crucial to successful teaching. Furthermore, in relation to the hiring and assessment of teachers, supervising administrators' addressed the importance of, and relationships between cognitive and affective characteristics and teaching ability. An overall perception expressed was that of a greater emphasis on the affective characteristics. A majority of the administrators perceived higher academic abilities to be negatively related to a teacher's ability to connect and relate with students. A relatively high degree of importance was placed on affective characteristics such as personality, caring, and desire to work with students. This would imply the recognition of traditionally unmeasurable characteristics as being critical to teaching success, thus providing a focus point for teacher educators to develop instructional models that incorporate the teaching and learning of affective characteristics into the teacher preparation program. Further study should be conducted to investigate affective characteristics and to develop means of assessing preservice teachers on the characteristics. The findings from such studies could potentially provide different (and perhaps more accurate) measures used in the admission and retention process in teacher preparation.

Results indicated an overlap in measurement between a number of certification measures. This finding supports previous research by Dybdahl, Shaw, and Edwards (1997). Knowing that certain certification measures are related, further investigation should be conducted into the appropriateness of using multiple academic assessments that measure identical criteria. It is recommended that the ACT exam be reexamined as an admission criteria into the teacher preparation program, in particular for those students pursuing certification in agricultural education. Further inquiry should be conducted to assess the use of the ACT as an appropriate instrument in the admission of teacher preparation students. Furthermore, components of the C-BASE exam should be analyzed for measurement overlap between areas, and appropriate changes made to the instrument.

Future research should be conducted that includes teachers certified through alternative processes. The assessment of alternative and temporary certificate teachers could provide valuable information as it pertains to the use of certification measures in admission and certification. Furthermore, future studies should be conducted that incorporate student learning into the assessment of teaching performance. If the overriding goal of teacher preparation programs is to develop competent teachers that elevate student learning, it would be justified to include this component in the assessment of teaching performance. Findings from such research could provide valuable information that could lead to modifications in current theory and practice as it relates to teacher preparation.

The existing teacher preparation admission and certification measures at the University of Missouri may be excluding potential agriculture teachers. While standardized test scores and grade point averages are readily available, easily quantifiable, and useful in an academic setting, the use of such measures as admission, retention, and certification criteria may be overused in the admission and certification process. Further investigation into the prediction potential of the certification measures should be conducted with larger populations and across teaching disciplines.

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A Five-Year Longitudinal Examination Of Faculty Needs Associated With Agricultural Distance Education

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Abstract

This study was conducted by the same researcher on the same population of faculty members over a period of five years, and was designed to measure changes in the faculty members' perceptions of their needs related to the use of technology to deliver instruction both on- and off-campus. Survey research methods were employed. Response rates were above 80% in both cases, and Cronbach's Alpha for all items combined across both instruments was .81.

Gender was significantly different. The number of female faculty members grew 283% over this five-year period. Faculty members in 2000 perceived that they had gained competence in technological skills. However, faculty members in 1995 were more certain of their ability to use appropriate teaching methods in technologically mediated environments than were those in 2000. While faculty members have gained access to and knowledge about technology over the past five years, they have lost confidence in their ability to use it appropriately in an instructional environment.

Faculty members agreed that the Internet is a convenient way to access information, that the incorporation of multimedia would improve most course materials, that students today prefer a more visual learning experience, and that the incorporation of electronic information technologies in the courses they teach is important. They remain convinced, even more now than five years ago, that these technologies will drastically alter <u>how</u> we teach in the next five years. More than a quarter of the faculty members now believe that communications and information technologies will drastically alter <u>what</u> we teach in the next five years.

In 1995, the greatest perceived need of the faculty to improve their use of electronic technologies in the teaching and learning environment was access to technical resources (hardware and software). Five years later, the faculty's primary concern shifted to a need for training and technical support.

Introduction and Theoretical Framework

Murphy and Terry (1995) conducted a study of faculty members' perceptions that might affect their adoption of the technologies often associated with distance education. The purpose of this research was "to provide baseline data and focus for the improvement of instruction in a college of agriculture through the utilization of electronic technologies used in teaching" (p. 2). As a term used in surveying, an established baseline is to be used for comparisons among measurements taken at a later date. According to Rogers (1995), the rate of adoption, that is, the amount of time that passes from knowledge of an innovation until the decision to adopt, varies among individuals. Rogers (1995) describes many difficulties in conducting research in diffusion and adoption, not the least of which is that the diffusion process can take years, or even decades, and the one-shot survey research methods are ill-suited to adequately describe such long-term processes. The recommendation is to conduct long-term research focused on a particular innovation. This is such a study. The first stage in Rogers' (1995) model for the adoption of innovations is knowledge. This study measures the changes in knowledge that the authors believe are prerequisite to the adoption of distance education.

Research in the field of distance education has recognized the need for a change and modification of the faculty role in teaching at a distance (Wedemeyer, 1981; Beaudoin, 1990; Dillion & Walsh, 1992; Purdy & Wright, 1992; Moore, 2000). "It is not that the technology underpinning distance education drives the system but rather that fundamental changes in teaching style, technique, and motivation must take place to make the new 'classrooms' of the present and future function effectively" (Purdy & Wright, 1992, p. 4). In a recent National Center of Education Statistics Report, "the support and adoption of distance education has led to the emergence of a number of policy issues," namely, equity of access; the cost of program development and implementation; accreditation and quality assurance; copyright and intellectual property rights; changes and challenges facing the role of faculty; and pressures on existing organizational structures and arrangements (U.S. Department of Education, 1999).

Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Gunawardena, 1990; McNeil, 1990; Schifter, 2000). "Attitudinal issues—how people perceive and react to these technologies—are far more important now than structural and technical obstacles in influencing the use of technology in higher education" (McNeil, 1990, p. 2). Other barriers stem from the lack of perceived institutional support (faculty rewards, incentives, training, etc.) for course conversion to distance education formats (Dillon & Walsh, 1992; McNeil, 1990; Olcott & Wright, 1995; Schifter, 2000; Wolcott, 1997) and the perceived increase in faculty workload as a result of using instructional technology (Visser, 2000). "The accelerated development of distance education programs across American higher education will require a renewed commitment to its most important resource . . . faculty" (Olcott & Wright, 1995, p. 5).

Despite the fact that much of the literature in distance education discusses the importance of faculty, this group has been largely neglected by the research (Dillon & Walsh, 1992; Beaudoin, 1990). In the Dillon and Walsh (1992) metaanalysis of studies examining faculty attitudes toward distance teaching, only one examined issues of faculty members who did not offer one or more courses via distance education. The researchers wanted to capture the perceptions of the entire teaching faculty of the College of Agriculture regarding the instructional use of the technologies often associated with distance education.

Purpose and Objectives

The purpose of this study was to identify and analyze changes in College of Agriculture faculty over the past five years regarding their competence, the importance they ascribe to, and their perception of the adequacy of the infrastructure to support the use of technologies for the improvement of instruction. The objectives were as follows.

1. Compare selected personal and professional characteristics of the teaching faculty of the college of agriculture at a land grant university in 1995 and 2000.
2. Compare the perceived level of competence that members of the teaching faculty of the college of agriculture have in the use of educational technologies in 1995 and 2000.
3. Compare the 1995 and 2000 levels of importance teaching faculty members assigned to these technologies and their effects on teaching and learning.
4. Compare the perceived quality of the infrastructure (equipment, facilities, and support) to support the 1995 and 2000 faculty members' use of these technologies.
5. Compare the 1995 and 2000 faculty members' suggestions for the improvement of instruction through the use of these technologies.

Methods and Procedures

Population

The population for this study was all teaching faculty in the college of agriculture at a land grant university with a research one classification. A census of the population was surveyed in both 1995 and 2000. In both cases, Department Heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, a total of 314 faculty members with teaching appointments were identified in 1994-95. The 1999-2000 population of teaching faculty, identified by the Department Heads, numbered 315. Inferences were drawn to this population. The reader may want to draw inferences to other similar populations, but is cautioned against drawing inferences to populations from institutions significantly different than this one.

Instrumentation

The instrument used to collect data in the 1994-95 study (Murphy & Terry, 1995) was a three-part questionnaire that employed a seven-point Likert-type response scale. The instrument used in the 1999-2000 study (Dooley & Murphy, 2000) used a five-point Likert-type response scale. The 1994-95 items were collapsed in this manner (1=1; 2+3=2; 4=3; 5+6=4; 7=5). Questions used on the 1995 study were replicated exactly on the 2000 study when possible. Some questions involving particular technologies were changed to better reflect current terminology.

Part I of both questionnaires was designed to identify the selected personal and professional characteristics of the respondents. The demographic variables included in both survey instruments were gender, age, and the number of undergraduate and graduate courses the faculty member taught per year.

Items in Part II were designed to measure the following:

- level of competence of faculty members in the utilization of technologies associated with distance education;
- perceived value or importance these technologies have or will have to the teaching of agriculture;
- perceived quality of infrastructure, described as the availability of equipment, facilities, and training related to the use of these technologies.

Part III provided an opportunity for the respondents to add their comments concerning the improvement of their use of distance education technologies. This part of the questionnaire consisted of a single open-ended question, identical on both instruments: "In your own words, what would significantly improve your use of the new electronic educational technologies often associated with distance education?"

Content validity of the instruments was established by a panel of five experts made up of faculty members from the Department of Agricultural Education, the Department of Educational Human Resource Development, and the Center for Distance Learning Research. A pilot test of the instrument was completed by selected faculty members. Minor changes in the instrument were made based upon evaluation of the pilot test and suggestions of the panel of experts.

Collection of Data

In both studies (Murphy & Terry, 1995; Dooley & Murphy, 2000), a census of the teaching faculty population was sent a copy of the questionnaire along with a cover letter describing the project via campus mail. Of the 314 survey instruments sent in the 1994-95 study, 256 were returned for a final response rate of 81.5%. In 1999-2000, 263 of 315 survey instruments were returned for a final response rate of 83.5%. The relatively high response rate was attributed in both cases to rigorous survey and follow-up procedures in accordance with those outlined by Dillman (1978).

Quantitative Analysis of Data

Data were analyzed using SPSS® 9.0 for Windows. Descriptive statistics were calculated for each variable. Early and late respondents were compared as suggested by Miller and Smith (1983). No significant differences were found between the groups in either the 1995 or the 2000 study. Reliability was established by calculating Cronbach's Alpha. These reliability estimates for each of the instruments were reported in the 1995 and the 2000 studies. The Cronbach's Alpha for all items combined across both instruments was .81.

The researchers realized that the study would be enhanced by paired analysis, but because of the anonymous nature of the 1995 survey instrument, it was not possible to match survey responses from the 1995 survey to the 2000 responses. SPSS was used to generate Crosstabs. Cell frequencies and percentages were used to summarize agreement or disagreement with statements related to competence, importance, and quality of infrastructure. Spearman's correlation coefficient, Rho, was used to determine if the faculty members' responses were statistically different. Spearman's Rho is a measure of association between data organized in rank order. Only those respondents who indicated "agree" and "strongly agree" or those indicating "disagree" or "strongly disagree" are reported in the findings. Thus, those respondents who indicated "somewhat agree," "neither agree nor disagree," or "somewhat disagree" were considered not to have a strong opinion about a given statement.

Qualitative Analysis of Data

The constant comparative method was used for the open-ended qualitative data analysis (Lincoln & Guba, 1985). This method described four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. For the first stage, the researchers studied the open-ended responses to determine trends in the data. Each idea (unit) was initially listed, without placement into categories. The investigators drew upon tacit knowledge in making these initial judgments for early category formulation. Colored markers were used to differentiate respondent themes so that the data would remain in context and provide visual indications of emerging categories. As the data analysis progressed, the researchers combined and more specifically defined categories based on overlying themes in the data. Once the categories emerged, fewer modifications were required as more data were processed. Delimiting the construction occurred as the data sources became saturated and the categories were integrated.

Results

Part I: Personal and Professional Characteristics of Teaching Faculty

Gender was significantly different (Spearman Rho = .146; p = .001). In 1995, 12 (4.7%) of the respondents were female, while in 2000 34 (13%) were female. Age was not statistically different. Fewer than a quarter (24.1%) of those responding were younger than 40 years old and over 40% were over 51 years old. That age was not statistically different also implied that the data could not have been treated with a paired analysis. If in fact the data were paired, then the average age should have increased by five years. Teaching load was also statistically unchanged. Over three fourths (79.8%) of the teaching faculty report teaching fewer than three courses per year, with 31 (6%) reporting teaching no classes during the year.

Part II: Competence, Importance, and Quality of Infrastructure

Competence. Seven items on both questionnaires were used to compare the perceived level of competence that respondents from each sample had in the use of teaching using technologies often associated with distance education.

Faculty members in 2000 perceived that they had gained competence in technological skills. However, faculty members in 2000 were less certain of their ability to use appropriate teaching methods in technologically mediated environments that were those in 1995. All seven items were significantly different statistically. Items indicating competence had positive correlations from 1995 to 2000 while items indicating methodological competence had negative correlations. The correlations are summarized in Table 1.

To illustrate, respondents were significantly different in their response to the statement, "I am comfortable creating my own presentation graphics." As depicted in Figure 1, faculty members in 2000 were much more likely to agree or even strongly agree. Comparatively, respondents were significantly different, in the opposite direction, in their response to the statement, "I am familiar with the teaching methods appropriate for distance learning." As depicted in Figure 2, faculty members in 2000 were much more likely to disagree or even strongly disagree with this statement.

Faculty members had much more confidence in their technical competence than they did in their methodological ability to use these technologies in their teaching. In both cases, significant numbers of the respondents (55.6% in 2000 and 30.1% in 1995) disagreed or strongly disagreed with the statement, "I am familiar with the teaching methods appropriate for distance learning."

Table 1

Differences in Levels of Competence

Statement	Spearman Rho	Asymp. Std. Error	Approx. T	Approx. Sig.
I am comfortable creating my own presentation graphics.	.329	.041	7.897	.000*
I use e-mail for almost all my correspondence.	.569	.033	15.687	.000*
I send my most important and confidential documents through e-mail.	.288	.041	6.802	.000*
I am able to scan photographs into digital files.	.183	.045	4.226	.000*
I am able to manipulate digital images using software like Photoshop.	.190	.043	4.397	.000*
I am familiar with the teaching methods appropriate for distance learning.	-.135	.045	-3.102	.002*
I could confidently deliver my course on TTVN.	-.085	.045	-1.928	.054

Significant at α .05

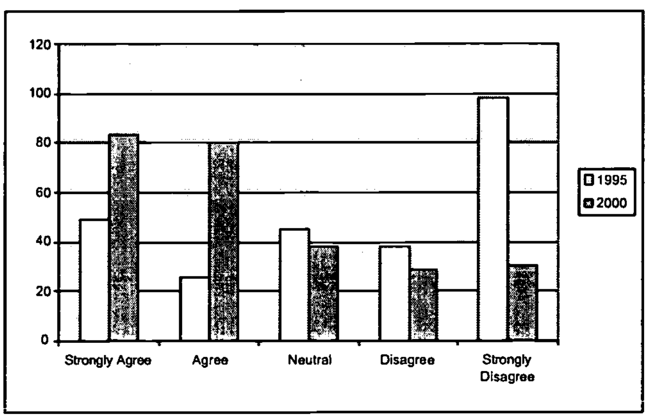

Figure 1: Use of Presentation Graphics

Importance. Nine items on both questionnaires were used to compare the perceived importance of the role respondents believed these technologies have or will have to teaching agriculture. All but one of these items were statistically significant. The Spearman Rho correlations are reported in Table 2.

Faculty members have changed their mind about the statement, "The Internet/WWW are convenient ways to access information." In 2000, they overwhelmingly agree or even strongly agree with the statement (45.3% in 1995 and 92.7% in 2000). While not statistically significant, nearly a third (30.5%) agreed or strongly agreed in 1995 with the statement, "Participation in listservs, threaded discussion groups, chats and other electronic communications offers great benefits," and more (48.3%) agreed or strongly agreed in 2000.

The respondents much more frequently agreed and strongly agreed (32.0% in 1995 and 58% in 2000) that most course materials could be improved by incorporating multimedia. They more frequently agreed and strongly agreed (32.0% in 1995 and 58% in 2000) that, "Animated graphics increase student interest and retention."

Almost exactly two-thirds (66.1%) of the respondents in 2000 agreed or strongly agreed that, "Students today prefer a more visual learning experience," whereas that number in 1995 was 20.3%. Over three-quarters (80.3%) of those responding in 2000 agreed or strongly agreed that, "Electronic information technologies provide students with instantly available supplemental course and research materials," while 57.4% shared that perception in 1995. Over one-half (60.8%) of 2000 respondents agreed or strongly agreed that, "It is important that I incorporate electronic information technologies in the courses I teach," while fewer than a third (30.0) shared that perception in 1995. The correlations are summarized in Table 2.

Faculty opinions have changed concerning the effect of these technologies. Many more faculty members (Spearman Rho = .120; p = .006) in 2000 share their colleagues' perception (53.9% Agree or Strongly agreed in 1995, and 69.9% Agree or Strongly agreed in 2000) that these technologies will drastically alter how we teach in the next five years. While not statistically significant, more respondents in 2000 also believe that communications and information technologies will drastically alter what we teach in the next five years (23.4% Agree or Strongly agree in 1995, and 30.0% Agree or Strongly agree in 2000).

Quality of Infrastructure. Eight items were used to compare the perceived availability of equipment, facilities, and training to determine the extent to which the campus environment had changed in its perception of the support available for the use of technologically mediated instruction on- and off-campus. All eight of these items were statistically significant. Moreover, in some cases the change was quite large. The correlations are summarized in Table 3.

In 1995, 5.1% agreed or strongly agreed that, "The equipment needed to produce and display multimedia course materials is readily available to me," in 2000 that number had grown to 42.2%. In 1995, 9.0% agreed or strongly agreed that they were aware of "the necessary procedure to secure electronic presentation equipment for classroom use within the university," over the next five years the number had grown to 54.0%. In 1995, 9.4% agreed or strongly agreed that that they "have access to a classroom designed to support the use of multimedia teaching aids," by 2000 the number was 52.2%. While e-mail was almost ubiquitously available in campus offices in 1995 the number did grow from 83.2% to 91.6%. Much more change occurred at home. During this five-year period, the number of faculty members connected to e-mail at home grew from 18.4% to 71.9%.

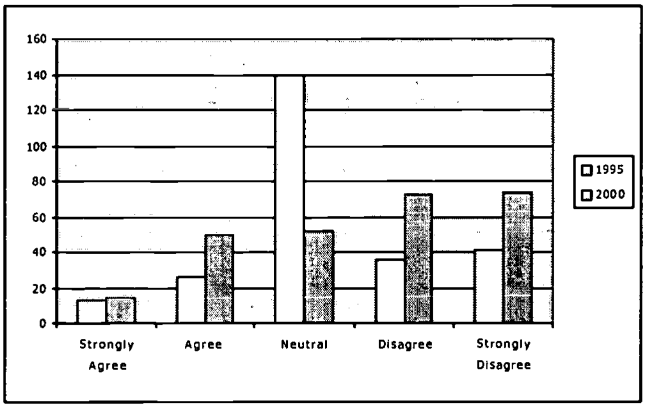

Figure 2: Teaching Methods

Table 2

Differences in Levels of Importance

Statement	Spearman Rho	Asymp. Std. Error	Approx. T	Approx. Sig.
The Internet/WWW are convenient ways to access information.	.486	.037	12.633	.000*
Participation in listservs, threaded discussion groups, chats and other electronic communications offers great benefits.	.074	.045	1.687	.092
Electronic communications and information will drastically alter HOW we teach in the next five years.	.120	.044	2.743	.006*
Electronic communications and information will drastically alter WHAT we teach in the next five years.	.010	.044	.221	.825
I think most course materials would be improved by incorporating multimedia.	.216	.043	5.025	.000*
Animated graphics increase student interest and retention.	.098	.044	2.239	.026*
Students today prefer a more visual learning experience.	.398	.041	9.878	.000*
Electronic information technologies provide students with instantly available supplemental course and research materials.	.180	.044	4.160	.000*
It is important that I incorporate electronic information technologies in the courses I teach.	.204	.044	4.746	.000*

* Significant at α .05

Table 3

Differences in Levels of Quality of Infrastructure

Statement	Spearman Rho	Asymp. Std. Error	Approx. T	Approx. Sig.
The equipment needed to produce and display multimedia course materials is readily available to me.	.273	.047	6.461	.000*
I am aware of the necessary procedure to secure electronic presentation equipment for classroom use within the university.	.402	.039	9.974	.000*
I have access to a classroom designed to support the use of multimedia teaching aids.	.364	.040	8.872	.000*
I am connected to e-mail and the WWW at my office.	.190	.039	4.409	.000*
I am connected to e-mail and the WWW at home.	.556	.036	15.203	.000*
There are ample opportunities to secure faculty development on using multimedia and videoconferencing equipment.	.111	.044	2.534	.012*
I have access to technical assistance when teaching at a distance.	.147	.044	3.365	.001*
The time spent developing course materials is valued by my department.	.088	.045	1.997	.046*

* Significant at α .05

In general, training and assistance in the use of instructional technologies was less available than equipment. From 5.9% the number who agreed or strongly agreed "there are ample opportunities to secure faculty development on using multimedia and videoconferencing equipment" grew to 26.6%. In 1995, 4.7% of respondents agreed or strongly agreed, "I have access to technical assistance when teaching at a distance," by 2000 that number was 29.9%. While the progress is obvious, the departmental climate is not perceived as supportive of the use of these technologies. In 1995 just 5.5% of faculty agreed or strongly agreed that, "the time spent developing course materials is valued by my department," by 2000 that number was 28.3%.

Part III: Suggestions for Improvement

In 1995, when faculty were asked, "What would improve your use of electronic technologies in the future," five major categories emerged. Although the qualitative analysis is not intended to provide "frequencies," using color-coding allowed the researchers a visual depiction of the number of times a particular theme was mentioned. Therefore, the categories are listed in this order as an indication of perceived importance. Representative quotes are included to "define" the category in the words of the respondents.

1. Technical Resource Availability (Classroom hardware and software) – 64 times
   Representative Quotes: "Need a facility in the building with proximity to equipment;" "Building connected to rest of campus and world;" "Decent classroom/computer, software, and projecting devices."
2. Training and Technical Support – 57 times
   Representative Quotes: "I need the time and opportunity to learn—time to develop materials and supporting technical personnel;" "I'd like to have someone else to do it!" (2 "Need for more courses (workshops/training) on how to use it."
3. Philosophically Opposed/Not a Priority; Need "Proof" – 35 times
   Representative Quotes: "Nothing beats a professor lecturing using chalk;" "Educational programs should be based on 'near' rather than 'distance:'" "I am not convinced that is an effective tool and that I should do it."
4. Rewards/Incentives – 35 times
   Representative Quotes: "We need development leave time" and "release time to incorporate these technologies." Other rewards were "credit for intellectual property," "funding or incentive grants," and "tenure and promotion recognition."
5. Audience Base – 10 times
   Representative Quotes: "The demand or need is not immediately apparent." Although this was not a prevalent category, it is important to note that if the demand for distance education is not apparent, faculty perceive that it is not worth the time and effort (related to other categories above).

Faculty surveyed in 2000 expressed the same categories but with a shift in perceived importance.

1. Training and Technical Support – 85 times
   Representative Quotes: "The ability to take a detailed workshop that would make me feel comfortable teaching via distance education;" "Help in the technology and software components;" "Access to technical and multimedia support, increased logistical support (staff) for room scheduling."
2. Rewards and Incentives – 78 times
   Representative Quotes: "To have departmental encouragement and reward for doing it;" "There needs to be some incentive for faculty to spend time on distance education development;" "Having the time release from usual/existing responsibilities would be very helpful. Funds to hire experts to develop the necessary materials to implement such a class would be great, too."
3. Technical Resource Availability – 47 times
   Representative Quotes: "The frequent technical problems discourage me. I will try in 10 years when snags are worked out;" "Better classroom equipment. I still use overheads because using my computer is a pain!" "Computers and projection equipment permanently installed in the classroom for instructor use."

4. Philosophically Opposed/Not a Priority; Need "Proof" – 8 times
   Representative Quotes: "If I felt [electronic technologies] improved learning. I am not convinced 'visual entertainment' enhances learning;" "Seeing solid evidence that peer institutions are successfully adopting similar approaches and are maintaining their academic reputations;" "I must be convinced that distance education does not create an inferior product. I am very concerned that the teaching style necessary for electronic delivery would compromise the learning experience for off-site as well as on-site students. It seems that the present climate emphasizes accessibility over excellence."
5. Audience Base – 4 times
   Representative Quotes: "An audience that expresses a need and is willing to provide financial resources to justify allocation of faculty time to course and materials development;" "My use would be expanded if there was a demand for my course off-campus."

Conclusions and Recommendations

The average teaching faculty member in this college of agriculture over the past five years was male and over forty years of age. He taught one to two undergraduate classes and one graduate class per year with an average annual enrollment of 120 students. Gender was found to be significantly different. While 34 of 263 is certainly not parity, 283% growth over five years is astonishing, and if maintained, would establish true numerical parity in less than 10 more years.

Faculty members in this college gained considerably in their competence in the use of electronic technologies. They would, in general, agree that they were competent in the use of these technologies. The same faculty, however, were less certain of their ability to use appropriate teaching methods in technologically mediated environments than they were in 1995. While a few more respondents reported that they were familiar with the appropriate teaching methods, many more disagreed and even strongly disagreed with the statement than in 1995. The authors contend that this may actually be a good thing. The first step to recovery is recognition of the problem, and many more faculty members recognized teaching methods as a lack in 2000 than in 1995. This new awareness may also have been affected by the recently expanded role the Department of Agricultural Education has taken in supporting faculty from across the college in the design and delivery of instruction.

This study found that teaching faculty members in the College of Agriculture considered the use of electronic technologies to enhance their teaching to be useful and important. Over 92% believe that the Internet and WWW are convenient ways to access information. They believed that these technologies would continue to have a substantial impact on teaching, changing how teaching is conducted within the next five years. A growing number of faculty members are coming to believe that these technologies will also change what we teach. The same technologies that enable us to change the way we do our job, improving the learning and teaching environments, are changing other fields as well. It was interesting to note that while the majority of faculty members agreed five years ago that these technologies would change how they taught, only a handful provided examples of ways their own teaching had been affected over the last five years.

While there is evidence of progress, teaching faculty members perceived training and assistance in the use of instructional technologies to be less available than equipment. Rogers (1995) describes that hardware is more quickly adopted because it is highly "observable." In the authors' own experience, there is often more administrative support for the purchase of equipment—possibly due to the highly observable nature of hardware. Resources should be redirected to helping faculty employ these newly purchased pieces of hardware in learning environments.

Based upon the qualitative analysis of faculty responses in 1995 and 2000, it is interesting to note that the same categories existed over time. Yet, the perceived importance of the categories shifted. In 1995, the greatest perceived need of the faculty to improve the use of electronic technologies was access to technical resources (classroom hardware and software). Closely related was the need for training and technical support on the use of these technologies. Many faculty were philosophically opposed to the idea of using these technologies in teaching, with a strong belief that teaching must occur through one-on-one contact. Although rewards and incentives were considered important, it appeared that the belief that technology would not be an effective teaching/learning tool took precedence over the consideration for rewards or incentives to promote faculty use of these technologies. Faculty did not see an apparent audience base for this type of instruction and therefore did not perceive the time and effort in technology integration to be worth it.

Five years later, the faculty's primary concern was for training and technical support. With significant university and college resources being dedicated to technological infrastructure, this is not surprising. Overall, faculty perceived that the technology is available but is a "hassle" to use or of poor quality. Faculty in the year 2000 have access to interactive video equipment and computer hardware and software, but lack the comfort level (competence) and time to attend workshops to learn how to use these technologies. This belief explains the importance of rewards and incentives to use technology. The faculty believed that if they had access to technical training and expertise (technical personnel) in addition to release time and recognition in promotion/tenure, then their use of electronic technologies would significantly improve. By the year 2000, fewer faculty member expressed philosophical opposition, although they continued to search for confimatory evidence that the use of these technologies will not diminish the teaching/learning experience. Faculty members in the year 2000 continued to seek an audience base to justify the additional time and resources necessary to convert courses into electronic formats.

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An Analysis of the Perceived Benefits and Affordances of Course Websites by Agricultural Students and Faculty Members

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Abstract

In this study, survey research methods were employed to examine the benefits and useful components or affordances of course websites. A census of teaching faculty in a Land Grant college of agriculture was surveyed resulting in 263 usable survey instruments with a response rate of 83.5%. A stratified sample of students was drawn to represent the College population in their class standing (e.g. freshmen, sophomore . . .) and academic major (e.g agricultural education, economics, biophysics . . .). The official enrollment in these classes was 1558. The final sample contained 1,304 usable instruments for an effective response rate of 83.7%. The final sample population, faculty and students, numbered 1567. A two-part survey instrument, designed by the researchers was used. Part Part I of the questionnaire was designed to collect selected demographic variables including gender, age, and indicators of experience using course websites. Part II provided an opportunity for the students to select perceived benefits of course web pages, and to identify the components of the course web pages they found most useful. Cronbach's Alpha for the eleven items in Part II was calculated on the pilot instrument prior to collecting data and found to be .91.

Students and faculty do not perceive the same benefits from course websites, in either amount or type. Course websites were perceived as benefiting students much more than faculty. Students and faculty also failed to agree on the usefulness of the course website components examined. In general, faculty members were much more optimistic regarding the usefulness of course website components than were students. The findings of this study suggest that the most useful components of course websites, as perceived by both faculty and students, are also the easiest to implement. The data suggests a diminishing returns relationship exists between the amount of additional effort expended by faculty members to implement a website component (e.g. multimedia course materials, course chat areas, etc.) and the students' perception of its usefulness.

Introduction

In a recent report to the Congress of the United States a national blue-ribbon panel, the Web-based Education Commission, (2000) stated:

> The question is no longer *if* the Internet can be used to transform learning in new and powerful ways. The Commission has found that it can. Nor is the question *should* we invest the time, the energy, and the money necessary to fulfill its promise in defining and shaping new learning opportunity. The Commission believes we should. The issue before us now is *how* to make good on the Internet's promise for learning. It is time we support education's new trailblazing heroes. It is time we collectively move from promise to practice (p. 143).

There are people who need numbers to be convinced. Abundant quantitative evidence exists in support of the Commission's conclusions. According to the National Center for Educational Statistics, an estimated 1,661,100 students enrolled in distance education courses, progressing through 1,230 degree programs, and 340 certificate programs offered in the 1997-98 school year *exclusively* through distance education. (NCES, 1999). John G. Flores, executive director of the United States Distance Learning Association predicts that distance learning will surpass $10 billion per year by 2005. "The market is growing at 100-percent a year with improved technology" (Roberts, 2000, p. 15). Home schooling is growing at an explosive rate, in large part due to web-based educational programs. The number of home-schooled students, K-12, in 1994 was 345,000. This number grew to 636,000 by 1996, and is expected to surpass 1.5 million this year (United States Department of Commerce, 1999). The number of distance courses offered by postsecondary institutions and the number of enrollments in those courses doubled between the 1994-95 and 1997-98 academic years (NCES, 2000). Educational delivery strategies making use of the Internet may have been only marginally important in the American educational delivery system, but they are clearly becoming main stream.

These on-line classes and programs constitute new environments for teaching and learning, yet little research has been done to determine their characteristics. If instructors are to effect positive change in their teaching in these new settings, more research into the nature of effective and efficient learning and teaching in these new environments will be necessary.

Theoretical Framework

Delivery strategies in agricultural education have been described as the appropriate application of instructional design principles, needs and learner analysis, curriculum development, delivery, and evaluation within a particular mix of technological delivery systems. In effect, what are appropriate instructional designs for use in a videoconferencing course designed to reach mid-career professionals in the Cooperative Extension Service? What instructional designs are appropriate for use in a WWW delivered course for high school students? These types of questions have often been answered without either a research or literature base. Clearly the development of appropriate delivery strategies will include some analysis of learner and faculty expectations. What is it that students and faculty perceive to be possible within a particular delivery strategy like a course website used to enhance an on-campus course? What capabilities do these websites afford?

A body of knowledge exists to assist with understanding these perceived capabilities. The term "affordance" was coined by the perceptual psychologist J. J. Gibson (1977, 1979) to refer to the relationships between objects (things) and actors (people or animals). Simply put, affordances are the set of possible actions one may perform on or with an object. All objects possess affordances. Affordances do not have to be determined (visible, known) to exist. They are not all necessarily desirable. For any given object some, if not most affordances are yet to be discovered. No one can imagine all of the affordances of even everyday objects.

More recently, Don Norman applied the theory of affordances to the design process in his book, "The Design of Everyday Things" (1990). Norman contends that affordances can be real and or perceived, and the two need not be the same. A button on a course Webpage may say

"Home," and the perceived affordance may be that clicking on that button would return the user to the homepage of the class. If clicking on the button in fact takes one to the homepage of the university, or to an error page, or does nothing at all, then the real affordance does not match the perceived affordance. Real affordances can be tested. If a user perceives that some action is possible, whether or not it actually is, than that is a perceived affordance. If a user perceives that some action is not possible, even if it actually is, than that is a perceived non-affordance. The action will in fact never occur, because the user will never attempt it. The real question, then, is almost always about perceived affordances. Do actors or users perceive that clicking on a particular button is a useful action? The usability of an object is in part a measure of its perceived affordances and to a lesser extent, the correlation between perceived and actual affordances.

Many faculty members question the effectiveness of on-line learning environments. Oliver, Omari and Herrington (1998) reported that the advent of relatively easy-to-use web course development systems like WebCT (www.webct.com) and Blackboard (www.blackboardcompany.com) encouraged many instructors to assume the role of course designer without adequate preparation. They found that in many instances the two roles are not interchangeable, and that the end result for the student is a poorly designed learning environment. They concluded that instructors should become familiar with ways to organize content, navigation strategies, guidelines for interface design, ways to provide the best forms of text presentation, improving document readability, and designing effective interactions before attempting to place a course on-line (p. 124).

Best practice in the design and development of course websites is a developing area of knowledge. This researcher was not able to locate any research-based information, but several authors, apparently relying on anecdotal evidence, suggested some common components be included in course websites (Cooper, 2000; Kaplan, 1998; Polichar & Bagwell, 2000; Rosenblum, 2000; Zirkle and Guan; 2000). The suggested components were categorized by the author into three groups by level of learner involvement. The three categories were; 1) static course components (e.g. course syllabus, presentations, readings, study guides, and old exams), 2) interactive course materials (e.g. links to other WWW resources, interactive practice exams or quizzes, multimedia course content), and 3) opportunities for electronically-mediated synchronous and asynchronous instructor-student and student-student interaction (e.g. e-mail, threaded discussion boards, chat areas).

Communication has long been considered an important, even essential, component of successful learning environments. Cooper (2000), suggested that Web-based courses are not exempt from this rule. Cooper identified three types of communication that should take place in web courses: instructor to student, student to instructor, and student to student. Electronic mail, threaded discussions, and on-line chat rooms were all described as ways to facilitate and maintain discussion.

The contribution of gender, as a variable in learner achievement in on-campus as well as technology-mediated learning environments, is poorly understood and remains a contentious issue (American Association of University Women, 1999; Bromley and Apple, 1998; Gray, 1992; McHaney, 1998). While many studies in this area have been criticized, the sheer weight of the accumulating evidence is difficult to ignore. In a recent study of 2,381 junior high and high school students in Texas, McHaney (1998) found that "Males have a higher personal affect for technology than females, but their understanding of technology's importance is very similar" (p. 161).

The Internet continues to grow as an instructional delivery system. Course websites possess perceived affordances, and these affordances have perceived effects, both desirable and undesirable in the instructional process. In order to begin to optimize the design of these instructional delivery strategies, the perceived benefits and affordances of course websites must be identified, described and evaluated.

Purpose and Objectives

The purpose of this study was to identify and describe the perceived benefits and affordances of course websites held by both students and instructors in agriculture. Four specific objectives were formed to accomplish this purpose.

1. Describe the demographic and experiential characteristics of the students and instructors utilizing course websites.
2. Examine any differences in the perceived benefits of course websites between faculty and students.
3. Examine any differences in the perceived value of selected course website components between faculty and students.
4. Examine any differences in the perceived benefits or components of course website between males and females.

Methods

Population

The population of interest for this study was all students and faculty in the college of agriculture at a land grant university. A stratified sample of the student population was surveyed. The sample was composed of intact courses randomly selected from different departments to provide a population indicative of the College population in their class standing (e.g. freshmen, sophomore . . .) and academic major (e.g. agricultural education, economics, biophysics . . .). A census of the college of agriculture faculty was surveyed.

Instrumentation

Survey research methods were employed to accomplish the objectives. A survey instrument, designed by the researchers after a review of the available literature, was developed by a team of researchers from the Department of Agricultural Education and an interdisciplinary center devoted to research in distance learning. The instrument was pilot tested on both students and faculty members. Minor adjustments in the wording and structure of questions were made to improve internal consistency. The instrument used to collect data for this study was a two-part questionnaire designed to be read by an OCR scanner. Part I of the questionnaire was designed to collect selected demographic variables including gender, age, and indicators of experience using course websites. Part II provided an opportunity for the students to select perceived benefits of course web pages, and to identify the components of the course web pages they found most useful. A panel of five experts made up of faculty members from the Department of Agricultural Education and the Department of Educational Human Resource Development established content validity of the instrument. Selected students from Agricultural Education provided input on face validity and completed a pilot test of the instrument.

Collection of Data

Student data were collected over a three-week period during regular class sessions. The survey instrument was passed out along with #2 pencils as students entered the selected classes and collected afterward. The survey was anonymous and completely voluntary. Students absent from class were randomly sampled without replacement until thirty had been contacted by telephone. The non-respondents data were compared to respondents and no significant differences were found, so the non-respondents were included for the analysis. The official enrollment in these classes was 1558. The final sample contained 1,304 usable instruments for an effective response rate of 83.7%.

All teaching faculty in the college of agriculture were surveyed. Department Heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, a total of 315 faculty members with teaching appointments were identified in 1999-2000. Of these, 263 survey instruments were returned for a final response rate of 83.5%. The relatively high response rate was attributed to rigorous survey and follow-up procedures in accordance with those outlined by Dillman (1978).

The final sample population, faculty and students, numbered 1567. Inferences were drawn to the population from which this sample was collected. The reader may want to draw inferences to other similar populations, but because of the sampling techniques employed the reader is cautioned against drawing inferences to populations from significantly different institutions.

Analysis of Data

Data were analyzed using SPSS® for Windows version 9.0 software. Descriptive statistics were calculated for each variable. Reliability was established by calculating Cronbach's Alpha. The alpha for the eleven items in Part II was calculated on the pilot instrument prior to collecting data and found to be .91. Post hoc reliability was calculated using the same techniques and found to be .86. Analysis of variance (ANOVA) statistical procedures were conducted to test the null hypothesis that there would be no difference between the responses of faculty and students and males and females.

Findings

Objective I: Demographic Data

The 1,304 students in the sample were 53% male and 47% female. Over 75% of the students were 18-21 years old. The 263 faculty members were 87% male and 13% female and over 77% of them were more than 41 years old.

Objective I: Experience With Websites

In general, about half of the students and faculty reported having some experience using course websites in the learning and teaching process. Over half (52.9%) of faculty reported that they have a course website. Most of these (84.3%) were designed to enhance the course and were not perceived as required components of the course by the faculty. Some 15.0% of faculty members (21) reported that their websites were required components of their courses. Student numbers were somewhat different with 24.8% of students (324) reporting that they were required to use course websites to access some assignments and 31.4% (410) reporting that some required course materials and assignments were available only through the course website. Still, 38.6% (503) students reported that the course website was not required at all.

Objective II: Benefits of the Course Websites

Students and faculty were asked to choose from among six statements following the question, "How do you benefit from course webpages?" Respondents were encouraged to choose all the benefits they believed applied. These data are summarized in Table 1.

Table 1.

Percentage Agreement on Benefits of Course Websites by Faculty and Students

Statement	% Faculty*	% Student*
None	35.0%	13.2%
Saves me time.	22.4%	41.6%
More convenient for me.	21.3%	47.9%
More efficient or effective communications between the faculty and students.	45.2%	36.3%
Increases my awareness of current technology.	24.0%	28.1%
I gain practical experience in using current technology.	25.9%	38.6%

*Totals may exceed 100% as respondents could select more than a single item.

While nearly half (47.9%) of the students believe that course websites make learning "more convenient for me," only 21.3% of faculty thought course websites made teaching more convenient. Far more students (41.6%) reported that the using this technology saves them time than faculty (22.4%). Students more often (38.6% vs. 25.9%) perceive that they "gain practical experience in using current technology" from these websites. Faculty more often (45.2% vs. 36.3 %) felt that the website facilitated "more effective or efficient communication between faculty and students." A relatively small percentage of both groups agreed that course websites "increase my awareness of current technology." Slightly over one third of faculty members (35.0%) and a minority of students (13.2%) responded that they do not benefit at all from course websites.

In comparing the differences in these numbers, all but one of the contrasts were statistically significant at the .01 level. Faculty and students perceive different benefits from the use of course websites. These data are summarized in Table 2.

Table 2.

ANOVA Benefits of Course Websites by Faculty and Students

Statement	Source	df	Mean Square	F	p
None.	Between	1	10.392	77.77	.000
	Within	1565	.134		
	Total	1566			
Saves me time.	Between	1	8.010	34.58	.000
	Within	1565	.232		
	Total	1566			
More convenient for me.	Between	1	15.439	65.40	.000
	Within	1565	.236		
	Total	1566			
More efficient or effective communications between the faculty and students.	Between	1	1.733	7.39	.007
	Within	1565	.234		
	Total	1566			
Increases my awareness of current technology.	Between	1	.370	1.86	.173
	Within	1565	.199		
	Total	1566			
I gain practical experience in using current technology.	Between	1	3.757	15.45	.000
	Within	1565	.243		
	Total	1566			

Part III: Useful Components of Course Websites as Perceived by Faculty and Students

In general, the static course components (e.g. course syllabus, presentations, readings, study guides, and old exams were perceived as the most useful by both faculty and students. Faculty members were more optimistic about the usefulness of course website components than were students. These data are presented in Table 3.

Table 3.

Percentage of Faculty and Students Identifying Website Components as Useful

Item	% Faculty*	% Student*
Course Syllabus	85.2%	***59.3%
Lecture Notes	66.9%	**59.7%
Additional information (background) about the instructor.	40.3%	***18.7%
Old Tests	50.2%	55.4%
Practice Exams and Quizzes	55.1%	58.4%
Study sheets, review materials, handouts that may be printed from the website.	71.1%	***53.7%
E-mail links to the instructor.	65.0%	***54.9%
Links to other on-line information sources.	64.3%	***22.9%
Presentation materials used in class presentations/demonstrations (e.g. PowerPoint Slides).	59.3%	***24.8%
Multimedia course materials (e.g. audio, video, graphics, and or animations).	41.1%	***11.0%
Access to student grades.	48.7%	***59.8%
Class discussion group or chat area.	39.2%	***7.4%
Contact information/links for the students in the class.	30.8%	***8.7%

*Totals may exceed 100% as respondents could select more than a single item.
** Significant at alpha .05. *** Significant at alpha .01.

Part IV: Male and Female Perceptions of Course Websites

While only a minority of males or females perceived that course websites offered no benefits, only females identified a single benefit with a frequency greater than 50%. These data are summarized in Table 4.

Table 4

Percentage Agreement on Benefits of Course Websites by Gender

Statement	% Males*	% Females*
None	20.8%	11.2%
Saves me time.	36.8%	40.6%
More convenient for me.	38.4%	50.5%
More efficient or effective communications between the faculty and students.	34.7%	42.3%
Increases my awareness of current technology.	27.6%	21.1%
I gain practical experience in using current technology.	34.0%	40.0%

*Totals may exceed 100% as respondents could select more than a single item. N=1567

Males and females differed in there perceptions of the benefits of course websites. Females perceived that course websites made the learning environment more convenient (females 50.5%; males 38.4%), and provided more efficient or effective student-faculty communications (females 42.3%; males 34.7%). These data are summarized in Table 5.

Table 5

ANOVA of the Benefits of Course Websites by Gender

Statement	Source	df	Mean Square	F	p
None.	Between	1	3.481	25.22	.000
	Within	1565	.138		
	Total	1566			
Saves me time.	Between	1	.546	2.31	.129
	Within	1565	.236		
	Total	1566			
More convenient for me.	Between	1	5.574	22.99	.000
	Within	1565	.242		
	Total	1566			
More efficient or effective communications between the faculty and students.	Between	1	2.168	9.26	.002
	Within	1565	.234		
	Total	1566			
Increases my awareness of current technology.	Between	1	.011	.05	.815
	Within	1565	.199		
	Total	1566			
I gain practical experience in using current technology.	Between	1	1.124	4.59	.032
	Within	1565	.245		
	Total	1566			

On the individual course website components, a majority of both males and females agreed that the course syllabus, lecture notes, old tests, practice exams and quizzes, study sheets, review materials, handouts, and e-mail links to the instructor were useful. They disagreed on the usefulness of links to other on-line information sources, presentation materials (PowerPoint), multimedia course materials, access to student grades, class discussion group or chat areas, and the posting of contact information/links for the students in the class. These data are summarized in Table 6.

Table 6

Percentage of Males and Females Identifying Website Components as Useful

Item	% Males*	% Females*
Course Syllabus	65.2%	61.4%
Lecture Notes	62.3%	58.9%
Additional information (background) about the instructor.	23.8%	20.2%
Old Tests	54.0%	55.4%
Practice Exams and Quizzes	56.6%	59.6%
Study sheets, review materials, handouts that may be printed from the website.	57.8%	54.9%
E-mail links to the instructor.	54.8%	59.3%
Links to other on-line information sources.	32.3%	***26.3%
Presentation materials used in class presentations/demonstrations (e.g. PowerPoint Slides).	33.2%	***26.9%
Multimedia course materials (e.g. audio, video, graphics, and or animations).	18.9%	***11.8%
Access to student grades.	55.4%	***62.8%
Class discussion group or chat area.	14.5%	***10.3%
Contact information/links for the students in the class.	15.0%	***8.7%

* Totals may exceed 100% as respondents could select more than a single item. N=1567.
*** Significantly different at the .01 level.

Males and females were not different in their perception of many of the useful components of course websites. In fact, on those components that more half of all respondents found useful; only the emphasis they placed accessing their grades online produced any disagreement at all, with females finding this component useful more often.

Females less often agreed that a class discussion group or chat area was a useful component of a course website, and slightly more that half as many females as males wanted contact information for other students, and by extension their own contact information, included on course websites.

Conclusions and Recommendations

While the number of female faculty members has increased markedly over the past five years, clearly we've got a long way to go to achieve parity with the number of female students enrolled in the college. If the current trend (300% in five years) in female faculty representation continues, another seven years would achieve approximate numerical parity.

Clearly, the benefits of course website are not the same for students and faculty. With the single exception of providing more efficient or effective communications between faculty and students, course websites were perceived as benefiting students much more than faculty. Neither faculty nor students perceived that using course websites increase their awareness of current technology, but significant numbers of both (one quarter of faculty and over a third of students) believe they gain practical experience in using current technology. This supports Murphy and Karasek's (1999) finding.

Students and faculty also failed to agree on the usefulness of all but two of the course website components examined. In general, faculty members were much more optimistic regarding the usefulness of course website components than were students. Perhaps predictably, more students (59.8%) that faculty members (48.7%) found online access to student grades to be a useful component. While a sample this large will find relatively small differences statistically significant if they exist, the differences do in fact exist, and in some cases are large. For example, while 64.3% of faculty members believe that links to other on-line information sources are a useful component of course websites, only 22.9% of students found them useful.

The findings of this study suggest that the most useful components of course websites, as perceived by both faculty and students, are also the easiest to implement. Posting these static course components (the course syllabus, lecture notes, study sheets, review materials, old tests, etc.) is relatively easy. The data suggests a diminishing returns relationship exists between the amount of additional effort expended by faculty members to implement a website component (e.g. multimedia course materials, course chat areas, etc.) and the students' perception of its usefulness.

While learner satisfaction is important, additional research assessing the instructional value of the various course website components identified here using some measure of learner performance or knowledge acquisition as the dependent variable should be conducted.

More females than males in this study perceived course websites as a useful addition to the learning environment. This finding appears to contradict McHaney's (1998) conclusion that males had a higher affect for technology.

Females and males tended to equally evaluate the most popular components of course websites. This finding supports McHaney's (1998) conclusions that male and female high school students have similar understandings of the importance of technology.

While neither gender afforded multimedia capabilities to course websites, females perceived these components as less useful than males. This could be due to the relatively poor quality of most instructional multimedia instructional materials delivered via the web. As the technology continues to mature, and additional resources are applied to create worthwhile multimedia materials these materials may be perceived as more valuable.

Interestingly, those components that would be used to provide additional student-student channels of communication (chat areas, contact information) were not perceived as useful by the majority of students in this study, and females found them less useful than males. More than half of the faculty members on the other hand thought these components were useful. The students finding contradicts the prevailing, although not research-based, conclusions in the current literature (Cooper, 2000; Kaplan, 1998; Polichar & Bagwell, 2000; Rosenblum, 2000; Zirkle and

Guan; 2000). Certainly the fact that all of the participants in this study were collocated with their instructors and were therefore able to interact in person would influence this result. Still, the evidence suggests that additional research should be conducted to determine when, in what particular educational delivery strategies, these components are perceived as valuable to the learners.

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Competencies for the Distance Education Professional: A Self-Assessment Model to Document Learning

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Abstract

This study developed a self-assessment instrument to document growth in distance education core competencies in a graduate course in a land-grant institution. Competency-based behavioral anchors served as authentication tools to document student learning. The researchers used naturalistic inquiry to design the data collection instrument and analyzed the data using constant-comparative methods. The authenticated results were reported in three areas: individual and average growth in core competencies, open-ended verification of growth, and attitudinal change. Although individual students showed great variation in competence at the beginning of the course, students had similar competency levels at the end of the course. This competency model worked well as a self-assessment and behavioral benchmarking tool to document student learning and teaching effectiveness. Instructors can use this information to enhance course rigor and modify or refine teaching strategies and content delivery.

Introduction/Theoretical Framework

Some may recall *A Nation at Risk* (1984) that initiated an intense reexamination of the quality of teaching and learning. Educational reformers continue to ask two fundamental questions: How well are students learning and how effectively are instructors teaching?

Exams, papers, projects . . . How should we measure what and how much our students have learned? There is public and political pressure on higher education to explain student learning and most colleges have begun to plan assessment strategies. Often administrators are trying to document what is happening in college classrooms, with faculty not fully involved in the process, and the results of the institutional assessment are rarely used to make a difference in the classroom (Angelo & Cross, 1993).

"Through close observation of students in the process of learning, the collection of frequent feedback on students' learning, and the design of modest classroom experiments, classroom teachers can learn much about how students learn and, more specifically, how students respond to particular teaching approaches" (Angelo & Cross, 1993, p. 3). This particular paper and research is based upon this premise. The researchers wanted to provide opportunities for the learners to reflect on their personal growth as they progress in professional competence in the field of distance education.

In agricultural education, numerous studies have been conducted to look at specific student competencies within specific contexts. Place and Jacob (2001) found that Extension employees needed resource management competencies such as time management, workplace, and stress management to be effective. McCormick and Whittington (2000) found that students needed well-developed abilities to think critically at higher levels of cognition. Dyer and Osborne (1996) found that problem-solving skills are needed and could be taught to agricultural education students. Goecker (1992) stated that agricultural education graduate students needed, but did not possess, very high levels of teaching and learning competencies to be effective and productive professionals.

Fewer studies have focused on the compilation of knowledge, skills, and abilities that influence student success (Garton, Spain, Lamberson, & Spiers, 1999). A student must possess certain knowledge, skills, and abilities in order to complete a planned course of study and graduate (Lindner, Dooley, & Murphy, 2001). Knowledge is a body of information applied directly to the performance of a given activity. Skill is a present, observable competence to perform a learned psychomotor act. Ability is a present competence to perform an observable behavior or a behavior that results in an observable product. Competencies, therefore, establish the behavior requirements needed to be successful as a student. Buford and Lindner (2002) define competencies as a group of related knowledge, skills, and abilities that affect a major part of an activity such as going to school. Competency models can be used: as a student recruitment and selection tool; as a student assessment tool; as a tool to develop curricula and other teaching material; as a coaching, counseling, and mentoring tool; as a career development tool; and as a behavioral requirement benchmarking tool (Yeung, Woolcock & Sullivan, 1996).

Little research, however, in the agricultural education field has focused on the competencies needed to be successful as a distance education professional. Based on a competency model developed by the American Society for Training and Development (ASTD), Thach and Murphy (1995) identified roles, outputs, and competencies of distance learning professionals within the United States and Canada. Their top ten competencies portray the dual importance of both communication and technical skills in distance learning. These competencies in rank order were: 1) Interpersonal Communication, 2) Planning, 3) Collaboration/Teamwork, 4) English Proficiency, 5) Writing, 6) Organizational, 7) Feedback, 8) Knowledge of the Distance Learning Field, 9) Basic Technology Knowledge, and 10) Technology Access Knowledge (Thach & Murphy, 1995). Williams (2000) replicated this study with similar results. Others have built complete degree programs (Ally & Coleway, 1999) or certifications (CDLR, 2001) to provide the coursework or professional development (competence) to work in the growing field of distance education.

Determining competencies needed for a given profession is an important first step, but the difficult task is in trying to measure and verify that competence! Industries, as well as universities, are struggling with appropriate techniques to document professional growth and learning over time. One method for addressing this problem is to develop and use competency-based and behaviorally anchored rating scales to measure student growth. In this study, behavioral anchors are defined as characteristics of core competencies associated with the mastery of content. Competency-based behavioral anchors are defined as performance capabilities needed to demonstrate knowledge, skill, and ability (competency) acquisition. Competency-based behavioral anchors require considerable time and effort to develop, however, they provide more accurate judgments than item-based scales (Buford & Lindner, 2002). Further, such anchors provide teachers and other expert raters with behavioral information useful in providing assessments and feedback to students. Such information can help students better understand their unique bundles of competencies and increase student satisfaction, motivation, learning, and ultimately success in a course (Drawbaugh, 1972). Competency-based feedback based on behaviors can provide a foundation for student-centered learning plans. Behavioral anchors can also be used to describe minimally acceptable knowledge, skills, and abilities on identified core competencies, thus, giving teachers tools and information needed to improve curricula, teaching materials, evaluation processes, and instructional delivery methods.

Purpose

The purpose of this study was to describe student growth (learning) in distance education core competencies in a graduate course in a land-grant institution. The study further sought to develop competency-based behavioral anchors for expert authentication to document student growth.

Methods

This study is grounded in the qualitative research paradigm. The general characteristics of this qualitative study reflect those identified by Fraenkel and Wallen (1999) as professionally acceptable and appropriate methods for studying a phenomenon when: The natural setting is the direct source of data (qualitative) versus a "snapshot" in time (quantitative); data are collected holistically from a participant's perspective (qualitative) versus relying on a participant's quantitative response (quantitative); the process (qualitative) as well as the variables of interest (quantitative) are considered; data is analyzed inductively (qualitative) versus deductively (quantitative); and data attempts to capture concern for a participant's behavior, attitude, reason, or motive (qualitative).

As with any study, it is important for the researcher to establish internal validity, external validity, reliability, and objectivity. However, in the qualitative paradigm these terms are referred to as credibility, transferability, dependability, and confirmability. Credibility and dependability were established by using the technique of triangulation. Member checks were conducted by providing respondents with a summary of the data to correct any misinterpretations. Transferability was established through the researcher's thick description of interpretations of the data allowing others interested in the study to draw conclusions. And finally, confirmability was established by conducting an audit trail. The researchers used a variety of qualitative methods to ensure truth value, applicability, consistency, and neutrality (Erlandson, Harris, Skipper & Allen, 1993, pp. 133-161).

The natural setting and prolonged engagement for this study was a five-month long course. The researchers used numerous data collection methods to capture responses from the participants' perspective. In analyzing the data, researchers considered participants' attitudes, comments, and meanings given to behavioral anchors. Data were analyzed inductively using competency-based behavioral anchors for authentication. Attempts to capture participants' behavior, attitudes, and reasons were described.

The purposive sample were twenty graduate students enrolled in an advanced methods of distance education course at a land-grant institution. There were eleven females and nine males in the course, fifteen who were master's students and five who were working toward a doctoral degree. The majors included agricultural education, entomology, horticulture, wildlife and fishery sciences, animal science, and educational human resource development. Respondents were coded based upon gender, major, and classification to determine any trends in the data, but still provide confidentiality. For example, the first male, doctoral student in agricultural education is coded as "MDAE1."

The course was taught via distance education (interactive video and WebCT). The content for the course was developed around the competencies for the distance education professional (Thach & Murphy, 1995). The researchers conducted a document analysis of course materials and clustered the distance education competencies into six major themes or "core" competencies needed by students and practitioners: Adult Learning Theory, Technological Knowledge, Instructional Design, Communications Skills, Graphic Design, and Administrative Issues (Figure 1).

Core Competency	**Behavioral Anchors**
Adult Learning Theory	• Philosophy of Teaching • Adult Learner Characteristics • Learning Styles
Technological Knowledge	• WebCT • Interactive Videoconferencing • Computer Hardware/Software • Communication Tools
Instructional Design	• Course Planning and Organization • Gaining Attention • Writing Instructional Objectives • Active Learning Strategies • Evaluation
Communication Skills	• "Presenting" Content • Questioning and Facilitation • Feedback • Collaboration/Teamwork
Graphic Design	• Formatting Visuals for TV Display • Design Considerations for Web-pages • Multimedia Components
Administrative Issues	• Support Services • Copyright/Intellectual Property • Technology Access • Financial Considerations

Figure 1. Core Competency Behavioral Anchors

A self-assessment instrument was created based upon the literature on distance education competencies and a document analysis of the graduate course content. The instrument was intended to serve as a reflection tool for the students to measure their growth (learning) in the six core competencies. The instructions noted that learners may or may not have grown in all areas. The researchers chose a stair-step approach (rather than a continuum or Likert scale) to visually represent progression from novice (0) to expert (7). The numbers were intended to measure perceived growth rather than any statistical significance. Averages were calculated to show trends in the data. Students were provided behavioral anchors, shown below, from which to base their pre and post competencies assessment (Figure 2).

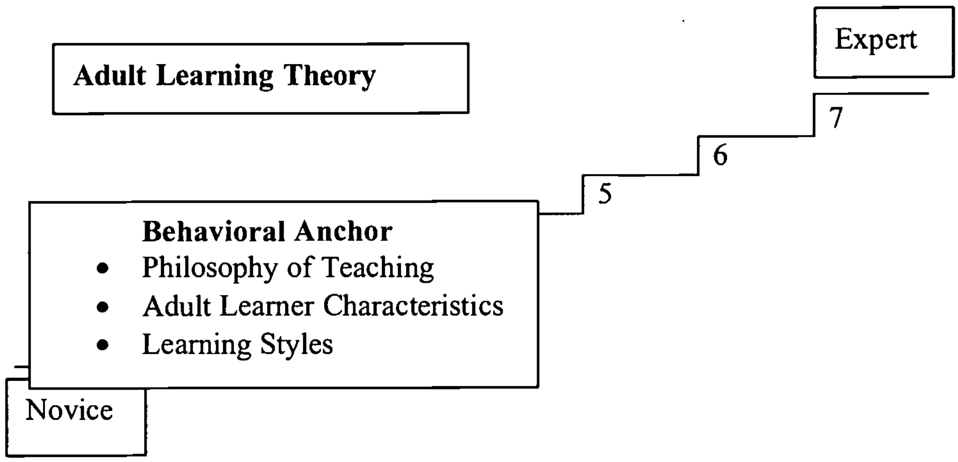

Figure 2. Example of Adult Learning Theory Core Competency on Self-Assessment

Two open-ended questions were used for verification: "Comments about your self-assessment (Where did your growth occur?)" and "Comments about any attitudinal change as a result of taking this course." The researchers also developed competency-based behavioral anchors at level 2, 4, and 6 to authenticate ratings and standardize judgments of expert raters (Smith & Kendall, 1963). Students' written comments with respect to self-assessment and attitudinal change, and any noted critical incidents, along with the researcher's professional expertise were used to establish the competency-based behavioral anchors (Figure 3).

The constant comparative method was used for data analysis (Lincoln & Guba, 1985, pp. 339-344). This method includes four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. In summary, the researchers completed a content analysis of the graduate course materials and compared competencies with those found in the literature for the first stage (Thach & Murphy, 1995; Williams, 2000). Once categories were integrated, six core competencies were identified. A self-assessment instrument was created based upon the triangulated and integrated themes. Numerical averages were calculated and open-ended responses were coded and categorized. An audit trail was used to document the data sources.

Results

The authenticated results of this study were reported in three areas: (1) the individual and average growth in core competencies, (2) the open-ended verification of growth categories, and (3) the attitudinal change as a result of taking this course. In Table 1, the individual growth is indicated for each of the six core competencies. The researchers determined that a 1.0 difference would serve as a discrepancy indicator between groups.

Core Competency	Level	Competency-Based Behavioral Anchors
Adult Learning Theory	2	• Show someone how to do a literature review on student-centered learning
	4	• Present a short workshop on the theory of andragogy
	6	• Develop and deliver a student-centered training program that incorporates adult learner characteristics and student learning styles
Technological Knowledge	2	• Show someone how to log onto a computer and search the Internet
	4	• Show someone how to access and use Web course tools
	6	• Show someone how to design and execute a Web-delivered course using Web course tools
Instructional Design	2	• Use an ice-breaker or opening to gain attention
	4	• Prepare a lesson plan
	6	• Write measurable instructional objectives for a curricula that provides for student-centered learning
Communication Skills	2	• Facilitate a videoconference
	4	• Create virtual teams for discussion threads
	6	• Design appropriate synchronous and asynchronous communications methods for delivering course materials at a distance
Graphic Design	2	• Rely on technical experts to develop multimedia
	4	• Show someone how to develop a PowerPoint presentation with graphics
	6	• Show someone how to use animation, video streaming, and text to effectively deliver content
Administrative Issues	2	• Rely on technical experts for scheduling and copyright clearance
	4	• Identify and use available support services to plan and organize a course
	6	• Determine fiscal, human, and technical needs to plan and implement a curricula entirely at a distance

Figure 3. Competency-Based Behavioral Anchors

For Adult Learning Theory, graduate students rated their competence from a 0-6 at the beginning of the course and from 3-7 at the end of the course. With 4 as the mid-point, nine of the students were a 4 or above before the course, and eleven were below a 4. Two students already possessed a strong competence in this cluster (Level 6). The average growth was from 3.4 to 5.2 in Adult Learning Theory (See Table 2). At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought. Male students, however, started out at a higher level of competence than female students.

Table 1. Individual Growth in Competency Clusters (N=20)

Respondent Code	Adult Learning Theory		Technology Knowledge		Instructional Design		Communications Skill		Graphic Design		Administrative Issues	
	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b
MDAE1	6	6	4	5	5	6	5	6	2	5	3	5
MDAE2	5	6	3	6	7	7	5	6	1	3	3	5
MDEN3	2	4	3	4	3	4	2	3	1	3	1	2
FDAE4	2	5	4	5	2	4	4	6	5	6	2	5
FDAE5	3	5	1	5	3	6	5	7	1	4	4	6
MMEH6	4	6	5	6	4	6	5	5	4	6	1	5
FMAN7	0	3	0	2	0	3	2	3	0	2	0	2
FMHT8	6	7	6	7	5	7	6	6	6	7	6	6
FMWF9	2	6	4	7	1	5	3	6	1	5	2	5
MMAE10	3	6	2	4	3	6	1	4	1	2	5	6
MMAE11	4	5	0	4	1	4	5	6	0	3	5	6
MMAE12	5	6	6	6	4	6	4	5	5	6	4	5
MMAE13	3	5	4	6	3	6	4	6	3	6	4	6
MMAE14	4	6	2	4	5	6	4	5	0	3	1	5
FMAE15	5	5	1	4	3	5	4	5	2	4	4	4
FMAE16	2	5	1	4	3	7	2	5	2	3	2	4
FMAE17	3	4	1	4	4	5	3	4	0	3	1	3
FMAE18	4	5	4	5	3	5	5	6	3	5	3	5
FMAE19	2	4	4	6	3	5	2	3	4	4	1	3
FMAE20	3	5	5	6	4	6	5	6	4	6	3	5
Note: B^a=Before; A^b=After												

Table 2. Average Growth in Competency Clusters (N=20)

Core-Competency	Class Average		Gender				Department				Degree			
			M		F		In		Out		M^c		D^d	
	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b	B^a	A^b
Adult Learning Theory	3.4	5.2	4.0	5.6	2.9	4.9	3.6	5.2	2.8	5.2	3.3	5.2	3.6	5.2
Technological Knowledge & Skills	3.0	5.0	3.2	4.8	2.8	5.0	2.8	4.9	3.6	5.2	3.0	5.2	3.0	5.0
Instructional Design	3.4	5.5	3.9	5.8	2.8	5.3	3.5	5.6	2.6	5.0	3.1	5.5	4.0	5.4
Communication Tools	3.8	5.2	3.9	5.1	3.7	4.9	3.9	5.3	3.6	4.6	3.7	5.0	4.2	5.6
Graphic Design	2.3	4.3	1.9	4.1	2.5	4.5	2.2	4.2	2.4	4.6	2.2	4.0	2.0	4.2
Administrative Issues	2.8	4.7	2.9	5.0	2.5	4.4	3.0	4.9	2.0	4.0	2.7	4.0	2.6	4.6
Note: B^a=Before; A^b=After; M^c=Masters; D^d=Doctoral														

The open-ended question about where the most growth occurred was analyzed based upon the core competencies. For Adult Learning Theory one student noted, "[Since] my undergraduate work did not include any education classes, everything I had learned about learning styles was gained through personal experience. Many of the discussion topics were quite relevant to my work in Extension and have helped me answer the 'why' question. That is, why do people prefer different teaching styles (I didn't even know what a learning style was before this class)? Without a doubt, most of my learning 'growth' occurred in the area of Adult Learning Theory." (MMAE10) Another student commented, "As for adult learning theory, I gained considerable knowledge into the different learning styles and characteristics of this audience. Most of my 'teaching' has been done with youth so it was neat to see how adults differ from youth in some ways but are also similar in others." (MMAE13)

For Technology Knowledge, graduate students rated their competence from 0-6 at the beginning of the course and 2-7 at the conclusion. The average growth was 3.0 to 5.0. As with Adult Learning Theory, Technology Knowledge varied greatly among graduate students. Two students also possessed a high level of expertise in technology upon entering the course. At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought.

For the open-ended comments on growth in Technology Knowledge, many students mentioned WebCT as the software tool they learned the most about (MDAE2, FMHT8, FMWF9, FMAE15, FMAE17, FMAE18). "I grew most in the area of technical competence. I had absolutely no idea what WebCT was and not much about distance education until this class." (FMAE15) "My biggest growth was learning so much about the technology through the use of WebCT and the communication tools." (FMAE17) "I was comfortable with the [interactive video], Internet skills and e-mail before, but definitely not WebCT. I have become a true WebCT convert, though; I have another class that is set up to use a WebCT site and nobody was daring to touch it. Through my painful and embarrassing experiences, I was able to actually help this class by answering several questions and now they are all able to get on there and communicate." (FMWF9)

In the third core competency, students assessed their knowledge of Instructional Design, ranging from 0-7 at the beginning to 3-7 by the end. One doctoral student in agricultural education had a score of 7, and eight students had a 4 or above at the beginning of the course. The average at the beginning of the course was a 3.4, with students assessing their competence at 5.5 by the end of the course (the highest competence average from within the six core competencies). At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought. Male students, however, started out at a higher level of competence than female students in Instructional Design.

One particular assignment posed the philosophical foundations of behaviorism and constructivism. A student mentioned, "[I grew] mostly in my theory of teaching and design of class techniques. I feel the reaction paper on constructivism and behaviorism really pulled information from other teaching courses together." (FMAE20)

In the context of distance education, Communications Skills incorporated the full gamut of presentation skills, from teaching over interactive video to asynchronous communication. Student self-assessments at the beginning of the course ranged from 1-6 and ended at 3-7. Thirteen students reported a score of 4 or better at the beginning of the course (the highest average competence at the beginning of the course). The average growth changed from a 3.8 at the beginning to a 5.2 at the end of the course. At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought.

One student stated, "I knew nothing about the vast number of techniques used to make a good presentation and make distance sites feel included. I had some distance courses in which I felt more comfortable than others, but I couldn't put my finger on why. Now I know all about eye contact with the camera and calling on students directly and keeping conscious of what is being projected over the screen." (FMWF9)

For the core competency of Graphic Design, students rated themselves between 0-6 at the beginning and 1-7 by the end. Nine students rated themselves a 1 or 0 at the beginning of the course. The average competence was 2.3 before participating in the course and 4.3 at the end (the lowest average of all the core competencies). At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought. "In the graphic design area my growth mainly occurred in the area of web-page design and formatting visuals for TV display. I had no idea all the work that goes into creating one [web-page]!" (MMAE13)

The final core competency was Administrative Issues. Students expressed beginning competence ranges of 0-6 and ending competence ranges of 2-6. Seven students rated themselves a 4 or higher at the beginning, with seven students clustering around 2-3. Six students rated themselves at a level of 0 or 1. The average level was a 2.8 at the beginning and 4.7 at the end of the course. By the end of the course, students had similar competency levels, regardless of gender, department, or degree sought. Students in the Department of Agricultural Education began the course with a higher level of competence than students in other departments.

"Most of my growth occurred in administrative issues such as copyright." (MMAE14) One student did not specify a particular area of growth but makes the comment, "The great thing about this class to me was to see how everything (skills and topics) come together. I have had classes in instructional design, graphic design, presentation skills, learning theory, but this class really showed me why they are all important and how they fit together." (MMEH6)

The constant comparative analysis of the attitudinal changes was a valuable addition to the self-assessment instrument. Often instructors measure the knowledge, skills, and abilities through course assessment tools, but may not capture the affective domain of learning. At the beginning of the course, students perceived distance education to be impersonal, with little interaction between the instructor and learners (MMAE10). Students were skeptical of its effectiveness (MMAE13, MDAE2, MDEN3, FMAE19, FMAE16) and nervous or hesitant to use the technology tools to mediate communication (MMAE14, FDAE4, MDAE1, FMAE15). After taking the course students realized the amount of preparation time needed to successfully design and deliver distance education instruction (MMAE11, FMAE20). Students appreciated the role of the facilitator in building rapport and interaction so that they felt involved (FMWF9, MDAE2, MMAE10). They also believed that distance education could provide access to people who cannot come to campus (FMAE19) and a richer environment for on-campus learners because of the ability to communicate with different people in different places (FMAE20). Some students believed that distance learners need to be more self-directed and motivated (MMAE13, FMAE18). After taking the course students were more inclined to take another distance education course (FMAE17, FMAE18) and to even teach one (MDAE2, FMAE17). Those that were skeptical and nervous were now more confident (MMAE14) and comfortable (MDAE1, FMAE15) with the distance education environment.

Conclusions and Implications

As we reexamine the notion of how well students are learning and how well instructors are teaching, there is a continued need to develop and refine student assessment instruments to evaluate and authenticate student growth. The findings of this study contribute to the growing body of literature related to identifying and assessing student competencies. It is recommended that this model be replicated in other distance education graduate courses and training programs to evaluate the extend to which the results presented here would be similar and applicable.

The competency-based behaviorally anchored instrument developed in this paper provides a model to evaluate and authenticate student growth (learning). This model also can be used to help students better understand their core competencies, which can be compared against behavioral anchors, and may increase student satisfaction, motivation, learning, and ultimately success in a course (Drawbaugh, 1972). This information can also be used as a foundation for student-centered learning plans. For example, a teacher would need to design and delivery individualized instructional sequences to provide the greatest opportunity for student growth when confronted with students with dichotomous competencies, such as FMAN7, who had little to no competence on any of the measurement items, and FMHT8, who had high levels of competence on most of the items. Without a way of documenting student competencies as they enter a program or course, a teacher cannot provide student-centered learning. At best, they would be forced to teach to "the middle." Unfortunately, this is often the case thereby providing course material that is too challenging for some students and too simple for others.

Although individual students' distance education competencies varied, results of the study show that on average students were below the mid-point at the beginning of the course and above afterward. Students increased approximately two steps in each of the core competency areas. At the end of the course, students had similar competency levels, regardless of gender, department, or degree sought, however, males started out at a higher level of competence in Adult Learning Theory and Instructional Design. Students in the Department of Agricultural Education were also higher in their beginning competence in Administrative Issues.

Findings show, additionally, that male doctoral students in agricultural education and male masters students outside the department began the course at higher levels of overall competence than other students. Male doctoral and female master students outside of the department began at a lower level of overall competence. As mentioned previously, all students completed the course at a similar level of overall competence. This information serves to document course curriculum and instructor/facilitator effectiveness in helping students achieve a certain level of competence. Teachers can further use this information to make judgments and to enhance the rigor and modify or refine teaching strategies and content delivery (help students acquire higher levels of distance education competencies).

This competency model worked well as a student self-assessment tool and as a behavioral benchmarking tool (Yeung, Woolcock & Sullivan, 1996). What is not known is the numerically acceptable level for competence. Is a step 4 or 5 acceptable or should graduate students be at a step 6 or 7? Obviously, graduate faculty must make judgments on acceptable levels of competence in order to give "grades" to students to determine student success. This model can be used to document minimally acceptable levels of competence, competency growth, or a combination of the two. For example, on one hand, an instructor may require students to show growth of at least two steps, to a minimum of step six, on two core-competencies for a student to receive an "A" in the course. On the other hand, an instructor may require an authenticated step 5 on four core competencies, and a step 4 on two for a student to receive an "A."

The competency-based behavioral anchors developed in this study provide for expert authentication of student growth (learning) as described above. Use of anchors to authenticate results overcomes limitations of self-administered rating scales that are typically used to measure student perceptions of competencies. This model can serve as an additional tool to measure the quality of teaching and addresses public and political pressure to explain student learning.

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Impact of an Asynchronous Activity on Academic Achievement of Abstract Leadership Concepts

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Abstract

Educators require a variety of delivery methods to maintain students' motivation and attention, and to address different learning styles (Born and Miller, 1999). Vehicles that can reinforce cognitive knowledge and provide students the opportunity to put theory into practice include simulations, role-play, and games. Alessi & Trollip (1991) provide five major types of computer-based instructional programs: tutorials, drills, simulations, instructional games, and tests. Computer-based multimedia gives instructional designers the tools of animation, video, and sound to provide learners with working models that convey complex concepts. The purpose of this study was to ascertain if the use of an asynchronously delivered simulation activity to teach leadership styles and ethics theory would improve learning. The study employed a quasi-experimental design with a non-equivalent control group. Comparison of student performance on selected examination questions revealed that the treatment group ($\underline{N}$=83) answered nine percent more questions correctly than did the control group ($\underline{N}$=113). In addition, students in the treatment group performed significantly better on examination questions written at the knowledge, comprehension, and analysis levels based on Bloom's Taxonomy of Learning Objectives: Cognitive Domain (Bloom, 1956). Students in the treatment group performed equally well, regardless of learning preference (visual, aural, kinesthetic or multi-modal). It was concluded that computer-based simulations have the ability to improve student learning of leadership concepts at higher cognitive levels while allowing students to apply theory to real world situations.

Introduction

Leadership skills are essential for everyone, both as members and leaders of groups (Gatchell, 1989). Madeleine F. Green (1992) observed that while many people learn leadership as they go, in an unplanned and serendipitous way, it is also possible not to learn from experience or by observing others. She concludes, "The central question, then, for developing effective leadership is how can these efforts be made deliberate and purposeful rather than accidental or serendipitous" (p. 59). It is widely agreed by leadership scholars that leadership can be taught (Bennis, 1989; Bass & Avolio, 1994; Kouzes & Posner, 1987). However, the most effective methods for teaching leadership to undergraduate students is not known.

Teaching in large lecture halls presents difficulties in challenging learners to higher cognitive levels. It is especially frustrating for instructors who are teaching abstract concepts such as ethics and leadership styles. Students lack the opportunity to practice the theory in real world applications. Instructional method selection may be able to address this dilemma.

Instructors need choices in instructional methods to maintain students' motivation and attention and to address different learning styles (Born & Miller, 1999). Vehicles that can reinforce cognitive knowledge and provide students the opportunity to put theory into practice include simulations, role-play, and games. Alessi & Trollip (1991) provide five major types of computer-based instruction programs: tutorials, drills, simulations, instructional games, and tests. Situational simulations deal with attitudes and behaviors in various situations and allow the student to learn by actually performing activities in a context similar to real life. Simulations often enhance motivation, encourage transfer of learning, and are efficient in regard to the length of time required by the student (Alessi & Trollip, 1991).

Computer-based multimedia provides instructional designers the tools of animation, video, and sound to provide learners with working models that convey complex concepts. Specifically, multimedia simulations provide stimuli to auditory, visual, and kinesthetic learners. "It is known that animation can increase learner interest and motivation, provide metacognitive scaffolding and mental models, and promote visual stimuli to establish connections between the abstract and the concrete" (Dooley, Stuessy & Magill, 2000, p. 29).

Learning modalities are the sensory channels or pathways through which individuals give, receive, and store information. Most students learn with all of their modalities, but have certain strengths and weaknesses in a specific modality (Reiff, 1992). These avenues of preferred perception include kinesthetic/tactual, auditory, and visual (Eiszler, 1983). Multimedia simulations that utilize varying colors and fonts, audio and video streaming, and animation have the ability to appeal to all types of learners.

Asynchronous simulations offer many advantages as a delivery strategy for leadership education. Simulations provide educators direct opportunities to include Gagne's nine levels of learning into instruction (Gagne, 1985) and allow the learner to explore a topic and receive feedback without public humiliation (Bill, 2001). "Computer simulation affords teachers and instructional designers a powerful tool for sustaining knowledge retention and transfer" (Bill, 2001, p. 5). "One of the most powerful uses of multimedia is to immerse the user in a learning environment" (Boyle, 1997, p. 35). Simulations encourage exploration and case-based learning while relating the abstract to the concrete. While it is believed that a simulation is a positive addition to the instructional design used in teaching "ethics and leadership styles," Boyle indicated the need to "fully evaluate their strengths and limitations" (p. 43).

Research supports the use of multimedia simulations and animations as effective delivery methods. Dooley, Stussey, and Magill (2000) found that the use of animations improved students' conceptual understanding of difficult material in an upper level biochemistry course, regardless of the level of complexity. A study of engineering students using a computer simulation in conjunction with classroom instruction indicated that a substantial gain in the retention of the subject matter was obtained compared to students using only conventional teaching methods (Firth, 1972). Herrington and Oliver (1999) found that multimedia programs that were based on a situated learning approach provided an environment where higher order thinking occurs.

Instructors often strive to teach higher order thinking skills. Lewis and Smith (1993) offer a comprehensive definition: "Higher order thinking occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations" (p.136). Encouraging students to participate in higher order thinking can be challenging, however utilizing the taxonomy of learning objectives devised by Benjamin Bloom and colleagues (1956) can facilitate the process. This taxonomy separates objectives into six hierarchical categories: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Bloom's six categories represent unique elements. Knowledge includes recall of terminology, facts, and other previously learned material. Comprehension is defined as understanding the meaning of informational materials. Objectives that require the student to use previously learned information in new and concrete situations to solve problems fall into the application category. Analysis requires the breaking down of informational materials into their component parts and examining them to reach divergent conclusions. Synthesis objectives require students to creatively apply prior knowledge and skills to produce something new. Evaluation requires the judging of material, based on certain standards or values, to create an end product (Bloom, 1956).

Whittington (1995) showed that professors in the College of Agriculture at The Pennsylvania State University were teaching primarily at the knowledge (47%) and comprehension (33%) levels of Bloom's taxonomy most of the time. Given that simulations encourage students to think at higher than the knowledge level, it is believed that this approach may be effective in teaching leadership education.

Born and Miller noted that choices in instructional methods are needed to maintain students' motivation and attention and to address different learning styles (1999). Miller (1997) stated, "College teachers of agriculture should engage in action research to find practical ways of using learning styles data to improve instruction." The investigators sought to examine an asynchronously delivered simulation as an instructional method and determine its effectiveness and impact on learning.

Purpose and Objectives

The purpose of this study was to determine if an asynchronously delivered simulation activity to teach leadership styles and ethics theory would impact learning. The specific objectives of the study were as follows:

1. Compare the performance on selected examination questions of students who had completed an asynchronous simulation activity with students who had not completed the activity.
2. Determine if an asynchronously delivered simulation activity impacted performance depending on the level of cognitive learning as defined in Bloom's Taxonomy of Learning Objectives: Cognitive Domain.
3. Compare the performance of the treatment group on selected examination questions based on their individual learning preference.

Procedures

Design of study

This study utilized a quasi-experimental design with a non-equivalent control group (Fraenkel & Wallen, 1999). The treatment (a computer-based simulation activity) was administered to a group of students (N=83) taking an upper level undergraduate agricultural education course, *Professional Leadership Development*, during the spring semester of 2001. Treatment group performance was compared to a group of students who completed the class during the fall semester of 2000 (N=113) and who had not received the treatment.

Students, in both the treatment and control group, were taught using lecture, guided discussion of leadership case studies, small group discussion, and reflective activities. Material on ethics and leadership styles were taught utilizing the identical instructor and delivery methods both semesters. The only difference in instructional delivery was the use of the computer-based simulation for the treatment group.

Three leadership style theories were taught prior to the implementation of the simulation activity: Situational Leadership Theory, the Style Approach (Northhouse, 2001), and the Leadership Continuum Model (Tannenbaum & Schmidt, 1958). In addition, ethical leadership was discussed in relation to two theories: the Six Pillars of Character (Josephson Institute of Ethics, 2000) and the six value systems identified by Spranger (1929) that motivate people to think and act as they do.

The learning activity entitled, "Project Interaction," was designed based on findings from a previous study that indicated a preference for audio and graphics over video and text (Boyd & Murphrey, 2001). The activity covered one unit within the course that focused on "Ethics and Leadership Styles," which was designed during Fall 1999 and developed the following year. Design of the activity followed recommendations provided in *Computer-based Instruction: Methods and Development* (Alessi & Trollip, 1991). The asynchronous learning activity was designed using a simulation model and created with the computer program Macromedia Flash. The simulation includes the following components: objectives, directions, an opening, the body (presentations and student actions), and conclusions. The activity is comprised of narrated audio clips, sound effects, text, and graphics. Students are placed in the position of a human resources director with personal knowledge about a job applicant. The students must decide whether or not to tell the search committee what they know about the candidate. Students learn of the potential consequences of their decisions throughout the activity through the presentation of animated clips to which students are asked to respond by answering a question based on what they learned. The process continues for multiple levels. At the conclusion of the activity, the learner is presented with a unique summary of what should have been learned in the activity. There are eighteen possible routes within the program. At the end of each route, following the unique summary, students are provided an opportunity to go through the simulation again or to proceed to a self-test quiz. The self-test quiz combines both content and questions to create an interactive learning experience.

Creativity was used to generate a unique approach to the topic, "Ethics and Leadership Styles," in an attempt to match student preference for learning discovered in the previous study. The activity used colorful graphics, animations, and entertaining audio to maintain the students' interest while teaching a lesson about the implications of ethical decisions and leadership styles. The purpose of the learning activity was to encourage retention of the primary principles covered in the units. The asynchronous approach was selected to allow each student to learn at his/her own pace; however, the activity could be used in a traditional classroom setting.

All students in the treatment group received the computer-based simulation on a compact disc (CD-ROM), and were provided both written and oral instructions. Students were told that participating in the simulation was strictly voluntary, but that it was a self-paced activity designed to let them apply theories that had been discussed in class. Students were asked to report if they used the simulation activity and how many times they went through the scenario. Eighty-three students reported running the simulation at least once.

The performance of treatment group responses ($\underline{N}$=83) on six examination questions relating to ethics and 16 questions relating to leadership styles were compared to the performance of the control group ($\underline{N}$=113). Differences between the treatment and control group were determined using the t-test for independent samples.

The questions were categorized using Bloom's Taxonomy of Learning Objectives – Cognitive Domain (Bloom, 1956) by the authors and verified by a panel of two faculty members experienced in curriculum design and familiar with the taxonomy. T-tests were used to describe differences between treatment and control group performance on each taxonomic category.

Students also completed the Visual, Auditory, Read-write, and Kinesthetic (VARK) Learning Styles Inventory to ascertain their predominant learning preference (Active Learning Site, 2001). The inventory consists of thirteen questions designed to determine a student's preferences for taking in information. Analysis of variance was used to discriminate among mean scores of students with different learning styles.

Findings

Comparison of the control and treatment groups was based on four characteristics: overall class grade point average (GPA), percentage of class enrollment from each college, student classification, and gender. These data were collected from the Student Information Management System at Texas A&M University. Table 1 summarizes the differences between the two groups and reveals that they are similar. The average GPA for the control group and treatment group were 2.80 and 2.70, respectively. The class average GPA for the control group was not significantly higher than that of the treatment group. Males comprised 63% of the treatment group as compared to 53% for the control group. In contrast, the treatment group consisted of 37% females compared to 47% for the control group. The control group consisted of 4% sophomores, 22% juniors and 74% seniors, while the treatment group consisted of 11% sophomores, 31% juniors, 57% seniors.

Agriculture majors comprised slightly more than 88% of the control group and 80.5% of the treatment group. This is not unusual as *Professional Leadership Development* is a required class for all Agricultural Development and Agricultural Business majors at the university. The colleges of Engineering, Liberal Arts, and Science constitute the bulk of the remaining students enrolled during both semesters.

Objective 1

Objective one was to compare the performance on selected examination questions of students who had completed an asynchronous simulation activity with students who had not completed the activity. Chronbach's Coefficient Alpha revealed a moderate internal reliability (0.62) for the 22 test questions used to assess differences in learning between the two classes. While an alpha of .62 is normally not considered rigorous, the examination questions are considered inherently valid and reliable because they have proven effective in measuring knowledge and understanding through repeated use.

The control group (students who did not participate in the simulation activity) averaged 76% correct answers (16.79 out of a possible 22). The treatment group (students who utilized the simulation as a learning activity) answered 85% of the questions correctly (average of 18.68 out of a possible 22). T-tests revealed that the differences in total correct answers between the treatment and control groups were statistically significant at the .05 level. Table 2 describes the results of the t-test comparison.

Objective 2

Objective two was to determine if an asynchronously delivered simulation activity impacted student performance depending on the level of cognitive learning as defined in Bloom's Taxonomy of Learning Objectives: Cognitive Domain. The twenty-two examination questions were categorized according to Bloom's Taxonomy of Educational Objectives – Cognitive Level (Bloom, et al., 1956). The questions fell into four categories: knowledge, comprehension, application, and analysis. The mean number of correct answers between the treatment and control groups for each cognitive category was compared using the t-test for independent samples. Mean scores and t-values are reported in Table 3. T-values for the cognitive levels for Knowledge, Comprehension and Analysis revealed a statistically significant difference between the mean number of correct answers for the treatment group and the control group. While t-tests did not reveal a significant difference between mean scores at the application level for the two groups, it is significant to note that there were only three questions classified at the application level.

Objective 3

Objective three was to compare the performance of the treatment group on selected examination questions based on their individual learning preference. Analysis of variance (ANOVA) was conducted to determine whether differences in performance on selected test items existed between students with different learning preferences. ANOVA results are reported in Table 4, and reveal no significant difference between students with different learning preferences.

Table 1

Characteristics of Treatment and Control Group Students in an Agricultural Leadership Class, 2001

Characteristic	Control[a]	Treatment[b]
Grade Point Average (GPA)	2.80	2.70
Classification		
Sophomores	4.%	11%
Juniors	22%	31%
Seniors	74%	58%
Major		
Agriculture	88%	80%
Engineering	4%	7%
Liberal Arts	3%	5%
Education	<1%	3%
Business	<1%	2%
Science	3%	3%
Gender		
Male	53%	63%
Female	47%	37%

[a] N=124; [b] N=113.

Table 2

Comparison of Means of Students' Scores on Selected Test Questions in an Agricultural Leadership Class, 2001

Group/Semester	N	Mean[a]	SD	t-value [b]
Treatment	83	18.68	2.76	5.11
Control	113	16.79	2.40	

[a] Mean correct out of a possible 22 questions; [b] $p < .01$.

Table 3

Comparison of Mean Scores by Cognitive Level of Questions in an Agricultural Leadership Class, 2001

Cognitive Level	N	Mean[a]	SD	T
Knowledge[c]				
Treatment Group	83	7.07	1.21	5.10[b]
Control Group	113	6.18	1.20	
Comprehension[d]				
Treatment Group	83	4.21	0.90	2.42[b]
Control Group	113	3.88	0.93	
Application[e]				
Treatment Group	83	2.71	0.53	1.29
Control Group	113	2.61	0.51	
Analysis[f]				
Treatment Group	83	4.70	1.24	3.44[b]
Control Group	113	4.12	1.04	

[a] Average number of correct answers; [b] $p < .05$; [c] 8 total questions;
[d] 5 total questions; [e] 3 total questions; [f] 6 total questions.

Table 4

Differences in Mean Correct Answers by Student Learning Preference in an Agricultural Leadership Class, 2001

Cognitive Level	Visual N=4	Auditory N=3	Kinesthetic N=22	Read-Write N=7	Multi-Modal N=46	F[a]
Knowledge[b]	8.00	5.67	6.91	7.43	7.11	1.93
Comprehension[c]	4.00	3.67	4.14	4.29	4.28	0.44
Application[d]	3.00	2.67	2.64	2.71	2.72	0.40
Analysis[e]	5.50	5.00	4.77	4.71	4.57	0.60

[a] $p < .05$; [b] 8 total questions; [c] 5 total questions; [d] 3 total questions; [e] 6 total questions.

Conclusions

The treatment and control groups were compared on four characteristics, class GPA, gender, student classification, and percentage of students from each college in the university. While the treatment group contained 16% fewer seniors and 10% more males than did the control group, these differences did not affect the overall academic performance of the two groups. Thus, it can be concluded that the two groups were similar.

Objective one was to compare the performance of the treatment and control groups on selected examination questions. Students who participated in the simulation improved their performance on selected test items by 9%. There were no significant differences in the performance between males and females in the treatment group. Based on the finding that students who participated in the computer-based simulation activity scored significantly better than students who did not, it may be concluded that the simulation was an effective means of delivering instruction.

Objective two sought to determine if an asynchronous simulation activity impacted the performance of students at different cognitive levels, based on Bloom's Taxonomy (Bloom, 1956). While the treatment group performed better on questions written at the knowledge, comprehension, and analysis levels, no significant difference was found for questions written at the application level. It may be concluded that the simulation is an effective delivery strategy for the lower cognitive levels (knowledge and comprehension) as well as the higher level of analysis.

Objective three compared the performance of students based on their learning preferences. Based on the finding that no significant difference existed between students with different learning preferences, it may be concluded that the simulation facilitated learning regardless of student learning preference.

Implications

The use of simulations holds promise as instructors look for more effective methods for delivering instruction. Based on the design of the activity that included animations, this study supports the findings of Dooley, Stuessy, and Magill (1999) who found that the use of computer-based animations greatly enhanced the ability of students to answer questions of increasing difficulty. Instructors who seek to improve students' understanding of abstract concepts should consider using computer-based simulations that emulate the working environment. Based on the conclusion that the simulation assisted students in answering questions written at the higher cognitive levels (the analysis level), educators should consider the use of computer-based simulations to facilitate higher order cognitive skills.

It is clear that instructional design principles must be followed when creating computer-based simulations. The simulation combined multiple forms of media (text, audio, and animation), thus explaining the lack of significant difference between students with different learning preferences. It should also be noted that categorizing questions according to Bloom's taxonomy is a subjective process, and while the researchers used a panel of experts to confirm classification, it is possible that some of the questions would be categorized differently by others.

Recommendations for Further Study

This study was limited to those students who self-selected to complete the simulation activity. Future research should examine if students who participate in voluntary and extra credit activities differ from those who do not participate in such activities. This study should be replicated, using the simulation as a required instructional module in the class, eliminating the option of students self-selecting to complete the simulation.

Given the fact that there were only three items in the application category, one questions if there were enough test items to measure significant learning at this level. Given this fact and the findings related to objective two, it is recommended that further research be conducted to determine if simulations facilitate learning at all levels of Bloom's taxonomy of learning objectives.

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Factors Associated with Research Productivity Of Agricultural Education Faculty

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Abstract

The purpose of this study was to determine the factors that explain the research productivity of agricultural education faculty in colleges and universities. In this study, publications in refereed journals was used as a surrogate for research productivity. The study described the research productivity of agricultural education faculty, their perceptions of the organizational culture that exists in their department to support research productivity, and their self-assessment of their research competency. The population for the study included all full-time, professorial rank faculty employed by colleges and universities in the United States that offered agricultural education.

In general, an organizational culture and support for research exists in the departments where the faculty work. The faculty have confidence in their ability to conduct research and reject statements that contain concerns about conducting research. The regression analysis revealed that three variables explained 50% of the variance in research productivity. These variables included number of doctoral students advised to completion in the last five years, faculty members' perceptions of their research confidence, and the number of graduate assistant hours allocated to the faculty member. The variables that did not explain a significant proportion of the variance were percent of the faculty member's time allocated to research, salary, organizational culture and support of research, age, gender, rank, number of masters students advised to completion in the last five years, and number of years they had held a tenure track position.

Introduction

Every profession has a system that is used to evaluate its members. In higher education, past and recent studies have shown that research productivity plays a major role in attaining success in academia as it relates to promotion and tenure, salary, and the fringe benefits of the profession. Studies have also shown that research productivity varies widely from institution to institution depending on the emphasis that is placed on three key aspects of higher education, namely, teaching, research, and service.

Faculty members with longstanding success or integrity in research are often admired by other faculty and students as being on the cutting edge of their field and are regarded as knowledgeable about most issues in their field. These faculty members are seen as more powerful educators and often serve as a frame of reference for junior faculty members or others who are developing their own research agenda (Levine, 1997).

Most agricultural education faculty members believe in the importance of all three parts of the university mission and that all parts of the mission are just as important in agricultural education as they are in any other academic field (Kelly & Warmbrod, 1986). This study focused on the research function of the universities' teaching/research/service mission.

Theoretical/Conceptual Base

The 1990s was a decade of increased productivity of published research in higher education (Sax, Astin, Korn, & Gilmartin, 1999). Although several studies have been conducted in areas such as research methods and research needs in agricultural education in recent years, a search of the literature reveals that minimal attention has been paid to research productivity of faculty in agricultural education. In a Delphi study using external decision-makers that addressed the mission, initiatives and obstacles to research in agricultural education, Buriak and Shinn (1989) reported that inadequate qualifications, insufficient funds, and a lack of value of research among agricultural educators were among the obstacles to the conduct of research.

Kelly and Warmbrod (1986) studied the research productivity of agricultural education faculty and found that " . . . . faculty members in agricultural education and home economics education are substantially less productive than faculty members in other areas of vocational education" (p. 29). In addition, they reported that agricultural education was underrepresented among faculty with the highest research productivity.

Several variables have been reported to be related to research productivity. One key variable is the involvement of faculty with graduate student research. Kelly and Warmbrod (1986) found that the number of doctoral committees chaired successfully resulted in higher faculty research productivity. This was supported by Dundar and Lewis (1998) when they reported that high ratios of graduate students to faculty also correlates with productivity, and the percentage of graduate students that were hired as research assistants correlated highly with research production. Gorman and Scruggs (1984) also reported that participation in graduate student research was related to faculty research productivity.

Another factor related to faculty research productivity is the size of the institution in which the faculty member works. Behymer (1974) studied research productivity of faculty in four-year colleges and major research universities and reported that faculty in major research institutions publish more than faculty at four-year colleges. This was similar to the findings by Bailey (1992) in which he found a research productivity increase from Liberal Arts II Colleges through Research I Universities. Dundar and Lewis (1998), Gorman and Scruggs (1984), and Vasil (1992) also reported that institutional size was related to research productivity. However, Blackburn Bieber, Lawrence and Trautvetter (1991) reported that the characteristics of the employing institution was not related to research productivity.

Age has been included in several studies with conflicting results. Bland and Berquist (1997) observed that the average productivity of faculty seems to drop with age, however, many senior faculty members remain quite active in research activities and their products are comparable to those of younger faculty members. They also reported that there is no significant evidence that age determines a drop in productivity, but increased workloads and shifting emphasis is to blame. Gorman and Scruggs (1984) reported that age was related to research productivity. Blackburn et al. (1991) stated that the relationship between age and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Gorman and Scruggs (1984) and Vasil (1992) found that the number of years of professional employment was related to faculty productivity. Pfeffer and Langton (1993) reported that total years in the profession had a major impact on total research, but an insignificant effect on recent research productivity. Again, Blackburn et al. (1991) stated that the relationship between educational experience and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Gender and research productivity have been studied with mixed results. Bailey (1992) reported a higher level of research productivity by male faculty members. Other researchers have noted that female faculty members are lagging behind experienced male faculty members in research productivity (Gmelch, Wilke, & Lovrich,1986; Smith, Anderson, & Lovrich, 1995; Sax et al., 1996). Blackburn et al. (1991) stated that the relationship between gender and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Faculty members' confidence in their research abilities is related to faculty research productivity. Dean's (1982) model of faculty research productivity included the perceived level of legitimacy in one's research as an explanatory factor. Increases in ability and self-efficacy were also related to increased research productivity in studies conducted by Vasil (1992, 1996).

Several studies reported the relationship between research productivity and salary (Jacobsen, 1992; Pfeffer & Langton, 1993; Rebne, 1989; Tornquist & Kallsen, 1992). Since salary often reflects research productivity levels, this was expected. Paying attractive salaries in return for performance may serve as an incentive for higher productivity from faculty members. Higher salaries may also attract productive faculty while at the same time minimizing the possibility of losing active faculty to other institutions (Pfeffer & Langton, 1993).

The enhancement of the freedom to collaborate results in increased research productivity (Bland & Berquist, 1997). Landry et al. (1996) found that collaboration of all kinds may increase researchers' productivity. Pfeffer and Langton (1993) found that collaboration was reduced by wage dispersion.

Bailey (1992) found that rank is a significant predictor of research productivity. Dundar and Lewis (1998) found that departments with higher ranked faculty had higher research productivity. Vasil reported that rank is a significant predictor of research productivity (1992).

Kelly and Warmbrod (1986) stated that "Perceived institutional and departmental support for research are seen as the most important enablers to research productivity" (p. 31). Dundar and Lewis

(1998) found that the percentage of graduate students hired as research assistants correlated highly with research production. Only one study could be found (Dundar and Lewis, 1998) that addressed faculty size. They reported that programs with smaller numbers of faculty cannot compete in the area of research productivity with larger universities.

This study uses publication in refereed research journals as a surrogate for research productivity. This approach is supported by the literature. Radhakrishna and Jackson (1993) reported that publishing in refereed journals was ranked as the most important factor when agricultural and extension education department heads were asked to rank the importance of 13 factors in the evaluation of faculty. In a related study, Radhakrishna, Yoder and Scanlon (1994) concluded that "Publications (refereed articles in journals and paper presentations in conferences) are considered to be a very important component of faculty productivity" (p. 17). This finding is supported by a comment made by William J. Cooper, former Dean of the Louisiana State University Graduate School. Dean Cooper stated that "The only magic number is zero; if you haven't published in refereed journals, then publications in research conference proceedings, books and other publications are meaningless." (Personal Communication, August, 1990). In Kelly and Warmbrod's study (1986), most of the variance (84.1%) in their research productivity score was explained by publications in refereed journals, with the remaining variance explained by seven other variables. The decision to use refereed journal articles as a surrogate for research productivity was based on the studies cited here.

Purpose and Objectives

The purpose of this study was to determine the factors that explain the research productivity of agricultural education faculty in colleges and universities. In this study, publications in refereed journals were used as a surrogate for research productivity. This study addressed the following research questions:

1. Describe selected demographic characteristics of the agricultural education faculty in the study.

2. Describe the research productivity of agricultural education faculty members in the study (using publications in refereed journals as surrogate or estimate of research productivity).

3. Describe agricultural education faculty members' perceptions of the organizational culture that exists in their department to support research productivity.

4. Describe agricultural education faculty members' self-assessment of their research confidence.

5. Determine if selected variables explain a significant proportion of the variance in the research productivity of agricultural education faculty.

Research Methods and Procedures

Population and Sample. The population for this study included all full-time, professorial rank faculty employed by colleges and universities in the United States that offered agricultural education. The frame for the study was drawn from the membership files of the American Association for Agricultural Education. Using Cochran's (1977) sample size formula, a random sample of 228 faculty was selected.

Instrumentation. The scales and items used in the instrument were selected after a review of the literature and grounded in the theoretical base of the study. The face and content validity of the instrument was evaluated by an expert panel of university faculty and doctoral level graduate students in agricultural education and in human resource education. The instrument was pilot tested with 20 university faculty members. Changes recommended by the validation panel, when appropriate, and those identified as needed during the pilot test, were incorporated into the instrument. These changes occurred in the wording of items, the design of scales, and in the instructions for completing the instrument. Internal consistency coefficients for the scales in the instrument were calculated using Cronbach's *alpha* and were as follows: organizational culture/support for research scale - $\underline{a}$ =.88, and faculty self-assessment of research confidence - $\underline{a}$= .80.

Data Collection. The responses were collected using two mailings and a systematic follow-up of a random sample of non-respondents. Each mailing consisted of a questionnaire, cover letter, and stamped addressed return envelope. A response rate of 50.0% (114 out of 228) was attained after the completion of the two mailings and the telephone follow-up.

Data Analyses. The data were analyzed using descriptive statistics for objectives one thru four. Stepwise multiple regression analysis was used for objective five. The alpha level was set á priori at .05. To determine if the sample was representative of the population and to control for non-response error, the scale means for the two primary scales were considered to be the primary variables in the study and the scale means were compared by response mode (mail versus phone follow-up) as recommended by Borg (1987) and Miller and Smith (1983). There were no statistically significant differences between the means by response mode for the two primary scales in the instrument: Organizational Culture/Support for Research Scale - $\underline{t}$ = .02, $\underline{p}$ = .28, and Faculty Self-Assessment of Research Confidence Scale - $\underline{t}$ = 1.21, $\underline{p}$ = .23. It was concluded that no differences existed by response mode, and the data were representative of the population. The mail and phone follow-up responses were combined for further analyses.

Findings

Research Question 1: Demographic Characteristics of Faculty. This research question sought to describe selected demographic characteristics of the faculty in the study. Most of the agricultural education faculty were male (88 or 83.0%) and their mean age was 46.5 years ($\underline{SD}$=9.80). The mean salary of those who responded to this question ($\underline{n}$ = 89), without adjusting for length of contract, was \$64,302 ($\underline{sd}$= \$16,525), with most holding a 12 month contract (60 or 56.6%) . Of those responding, 38.7% (f=41) were full professors, 22.6 %(f=24) were associate professors, and 38.7 % (f=41) were assistant professors.

The participants reported their universities allocated an average of 67.4% of their time for teaching, 13.2% of their time for conducting research, 10.7% of their time for service duties, and 7.6% amount of their time for administrative duties. Almost all (105 or 99.1%) had earned the doctorate. The number of doctoral students advised to completion in the past five years ranged from 0 to 11 and the respondents averaged .8 completions (SD=1.77), while the number of masters students advised to completion in the last five years ranged from 0 to 50 with an average of 10.5 students advised to completion (SD=12.25).

Research Question 2: Faculty Research Productivity. In this study, articles published in refereed journals in the past five years were used as a surrogate for research productivity. Those surveyed reported that, in the past five years, they had published an average of 1.97 refereed journal articles for which they were the sole author (SD=4.20), an average of 3.14 co-authored refereed journal articles for which they were the lead author, and 2.64 co-authored refereed journal articles for which they were not the lead author (SD=3.20).

For the purposes of this study, total research productivity was calculated as follows: the respondent was given a credit of 1.0 for each article published for which they were the sole author, a credit of .50 for each co-authored article published for which they were the lead author, and a credit of .33 for each co-authored article published for which they were not the lead author. The mean faculty research productivity score was 4.42 (SD=5.95).

Research Question 3: Organizational Culture. The Organizational Culture/Support for Research (OCSR) Scale contained 20 items that assessed the faculty members' perceptions of the organizational culture and support for research that existed in their department. Responses were recorded on a five point Likert scale that ranged from 1=Strongly Disagree to 5=Strongly Agree. The responses are presented in Table 1. The respondents agreed with the two highest rated (M=3.68) statements, "My department supports my efforts to publish in refereed research journals", and "My peers recognize my efforts to publish in refereed research journals." The respondents strongly disagreed with the lowest rated (M=1.39) statement, "My department offers more or improved office space or facilities for those who publish in refereed research journals." The scale grand mean was 2.94 (SD=.63), which indicates that the respondents agreed with most of the items in the scale. The Cronbach's alpha for this scale was a=.88.

Research Question 4: Self-Assessment of Research Confidence. The fourth research question sought to describe the faculty members' self-assessment of their research confidence as measured by the Faculty Self-Assessment of Research Confidence. The respondents agreed with all items in the scale, with the highest rated item (M=3.91) being, "I am confident when writing the conclusions and recommendations of a study to be published in a refereed research journal." The overall mean for the scale was 3.80 (SD=.67). These data are presented in Table 2.

Table 1. Organization Culture/Support for Research (N=106)

Item	M	SD	N
My department offers merit pay for publishing in refereed research journals.	2.32	1.49	106
My department offers a reduction in teaching load for publishing in refereed research journals.	1.49	.99	106
My department offers desirable teaching assignments as a reward for publishing in refereed research journals.	1.41	.91	106
My department offers travel money as an incentive for publishing in refereed research journals.	2.35	1.44	106
My department offers more or improved office space or facilities for those who publish in refereed research journals.	1.39	.80	106
My department offers increased student support for individuals who publish in refereed research journals.	1.70	1.10	106
My department recognizes my efforts to publish in refereed research journals.	3.65	1.20	106
My department supports my efforts to publish in refereed research journals.	3.68	1.19	106
My peers recognize my efforts to publish in refereed research journals.	3.68	1.10	106
My peers support my efforts to publish in refereed research journals.	3.58	1.10	106
My university administration recognizes my efforts to publish in refereed research journals.	3.55	1.15	106
My university administration supports my efforts to publish in refereed research journals.	3.44	1.16	106
My department values collaboration in publishing refereed research articles.	3.63	1.10	106
Collaborative publishing of refereed journal manuscripts with other faculty in my department is encouraged.	3.51	1.16	106

(table continues)

Item	M	SD	N
Collaborative publishing of refereed journal manuscripts within my institution, but outside my department, is encouraged.	3.39	1.12	106
Collaborative publishing of refereed journal manuscripts with individuals from other institutions is encouraged.	3.42	1.10	106
I am encouraged by my department to involve students as co-researchers in my efforts to publish in refereed research journals.	3.30	1.15	106
My family supports my efforts to publish in refereed research journals.	3.60	1.12	106
My parenting responsibilities inhibit my efforts to publish in refereed research journals.	2.47	1.13	106
Faculty in my university view teaching as an impediment to publishing in refereed research journals.	3.28	1.20	106
Scale Grand Mean/Standard Deviation	2.94	.63	106

Note. 1=Strongly Agree, 2=Agree, 3=Undecided, 5=Disagree, 5=Strongly Disagree. Negatively stated items were reverse coded prior to calculating the grand mean.

Research Question 5: Explanation of Variance in Research Productivity by Selected Variables. The last research question sought to determine if selected variables explain a significant proportion of the variance in research productivity. A step-wise multiple regression procedure (N=94) was used to examine the amount of variance in research productivity explained by selected variables. The procedure revealed that three variables entered the model to explain 50% of the variance found in research productivity (R^2=.50). These variables included number of doctoral students advised to completion in the last five years (R^2=.37), faculty members' research confidence scale mean (additional R^2=.09), and the number of graduate assistant hours allocated to the faculty member (additional R^2=.04). The variables that did not explain a significant proportion of the variance were percent of the faculty member's time allocated to research, whether they were employed in a land grant university, age, gender, rank, number of masters students advised to completion in the last five years, and number of years they had held a tenure track position. It should be noted that, even though salary has been shown to be related to research productivity, faculty salary was not included in the regression analysis because of the high non-response rate on this variable.

Conclusions

In general, an organizational culture and support for research exists in departments where agricultural education faculty work. The faculty have confidence in their ability to conduct research and disagree with statements that contain concerns about conducting research. Three variables explain 50% of the variance in research productivity of agricultural education faculty members.

Table 2. Faculty Self-Assessment of Research Competency (N=106)

Item	M	SD	N
I am confident when writing the conclusions and recommendations of a study to be published in a refereed research journal.	3.91	.87	106
I am confident when writing the findings of a research study to be published in a refereed research journal.	3.90	.89	106
I am confident when determining a research methodology of a study to be published in a refereed research journal.	3.86	.81	106
I am confident when determining the purpose and objectives of a study to be published in a refereed research journal.	3.78	.80	106
The research I produce is respected by my peers.	3.75	.78	105
I am confident when conducting the data analysis of a study to be published in a refereed research journal.	3.74	.93	106
I am confident when determining a research/theoretical base of a study to be published in a refereed research journal.	3.70	.84	106
Scale Grand Mean/Standard Deviation	3.80	.67	106

Note. 1=Strongly Agree, 2=Agree, 3=Undecided, 5=Disagree, 5=Strongly Disagree. Negatively stated items were reverse coded prior to calculating the grand mean.

The number of doctoral students advised is the most powerful explanatory variable. This conclusion supports the research by Kelly and Warmbrod (1986) in which they found that the number of doctoral committees chaired successfully resulted in higher research productivity. This conclusion also supports the research by Dundar and Lewis (1998) in which they reported that high ratios of graduate students to faculty correlates with productivity. Gorman and Scruggs' (1984) conclusion that participation in graduate student research was related to faculty productivity is also supported.

The second explanatory variable was the number of graduate assistant hours allocated to the faculty member. This conclusion directly supports Kelly and Warmbrod's (1986) conclusion that "Perceived institutional and departmental support for research are seen as the most important enablers to research productivity" (p. 31) and Dundar and Lewis' (1998) conclusion that the percentage of graduate students hired as research assistants correlated highly with research production.

The third explanatory variable was the mean score on the research confidence scale, supporting Dean's (1982) model of faculty research productivity, which included the perceived level of legitimacy in one's research as an explanatory factor. Vasil's (1992, 1996) research is also supported; he found that increases in ability and self-efficacy were related to increased research productivity.

Although all variables included in this study were selected based on the theoretical and research foundation for the study, several variables do not explain faculty research productivity levels, namely, percent of the faculty member's time allocated to research, number of masters students advised to completion, age, gender, rank, size of the institution, and number of years in a tenure track position.

Implications

Research productivity has been and continues to be one of the most highly valued aspects of a faculty member's career, especially when university promotion and tenure, faculty evaluation, and university goals are considered. There are some in our profession who want university administrators to place a higher value on other forms of scholarly productivity. However, until that occurs, agricultural education faculty and administrators would do well to heed the results of this and similar studies.

For the immediate future, research productivity in the form of publication in refereed research journals will continue to be strongly encouraged. Faculty should attempt to find ways to chair more doctoral committees, work to secure more research assistance in the form of graduate assistants, and work to improve their confidence in their research abilities. Faculty may want to pay some attention to the other variables addressed in this study since they were related to faculty productivity in other studies.

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Statistical Significance Tests and Effect Magnitude Measures Within Quantitative Research Manuscripts Published in the Journal Of Agricultural Education During 1996-2000

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Abstract

Manuscripts published in the *Journal of Agricultural Education* are expected to comply with criterion established for mathematical and statistical copy set forth by the American Psychological Association (1994) and the editorial policies of the *Journal of Agricultural Education*. This paper described the reporting practices of 141 quantitative research manuscripts published in the *Journal of Agricultural Education* during the five year period, 1996-2000, concerning statistical significance tests and effect magnitude measures. Findings indicated quantitative research designs permeated most manuscripts. Findings also indicated statistical significance tests were utilized in almost half of the manuscripts to determine differences among variables where as, over half of these manuscripts failed to report any effect magnitude measures. Further findings indicated the proportion of effect magnitude measures were reported by less than one-third of all the manuscripts. The proportion of manuscripts utilizing statistical significance tests and reporting any effect magnitude measure were reported by less than one-fourth of all the manuscripts. It was recommended that researchers utilizing statistical significance tests include effect magnitude measures, power analysis, confidence intervals, and the adoption and enforcement of more strict editorial policies regarding statistical significance testing and effect magnitude measures. It was further recommended that Agricultural Education researchers review the debate between hypothesis testing versus effect size and to review these two statistical methods.

Introduction

Scholars have been conducting statistical testing for research purposes since the early 1700s, (McLean & Ernest, 1998). Descriptive and inferential statistics are the tools researchers use to analyze their research. The role of statistical significance testing in educational research has been the subject of much controversy recently (Kaufman, 1998; Knapp, 1998; Levin, 1998; McLean & Ernest, 1998; Nix & Barnette, 1998; Thompson, 1998). As early as 1931, R. W. Tyler noted the misuse of statistical significance, ". . . we are prone to conceive of statistical significance as equivalent to social significance. These two terms are essentially different and ought not to be confused" (cited in Daniel, 1998a, p. 24). Berkson (1942), Yates (1951), Kish (1959), and Kerlinger (1979) also lamented that too much emphasis was placed upon statistical significance tests as the end all product (Daniel, 1998a). Not until Cohen's (1962) first inquiry into how much power ($1-\beta$) did typical published research studies contain result in any serious examination of statistical significance versus practical significance. Since Cohen (1962), a cacophony of use and misuse of statistical significance tests has become a major methodological paradigm in journals of the social sciences (Brewer, 1972; Daniel, 1998a; Fern & Monroe, 1996; Thompson, 1999, March; Thompson & Snyder, 1997; Wilkerson & Olson, 1997).

The legacies of Sir Ronald Fisher (concerning differences of between and within groups using probability levels) and Karl Pearson (concerning correlation analyses providing indices of association) are two important approaches of statistical testing and how statistical analyses have developed (McLean & Ernest, 1998; Nix & Barnette, 1998). This paper explains the cogency in reporting effect magnitude measures along with statistical significance tests and examines this relationship in quantitative research manuscripts published within the *Journal of Agricultural Education* during 1996-2000.

Editorial Policies

Utilizing the *Publication Manual of the American Psychological Association (1994)* as a source of clear communication for authors submitting manuscripts to the *Journal of Agricultural Education*, the American Association for Agricultural Education accepted an agreed upon style for standards of content and form when reporting statistical and mathematical copy. The American Psychological Association (1994) "encouraged" that authors of manuscripts using inferential statistics "include sufficient information to help the reader corroborate the analyses conducted" (p. 16). Moreover, when reporting inferential statistics, authors of manuscripts should "include information about the obtained magnitude or value of the test" (p. 15).

In order to determine if the statistical significant tests are of any practical significance, Vasquez, Gangstead, and Henson (2000) reiterated that journals in the education field require authors to report the relative treatment magnitude along with the statistical significance test. The *Journal of Agricultural Education* along with *Educational and Psychological Measurement*, *Journal of Applied Psychology*, *Journal of Consulting and Clinical Psychology*, *Journal of Experimental Education*, *Journal of Learning Disabilities*, *Language Learning*, *The Professional Educator*, and *Research in the Schools*, have adopted editorial policies regarding statistical significance tests and effect sizes (Thompson, 2000). Specifically, the guidelines for authors set forth by Kotrlik (2000) on the inside cover of the *Journal of Agricultural Education* reads, "Authors should report effect sizes in the manuscript and tables when reporting statistical significance." For consumers to interpret research within the *Journal of Agricultural Education*, it is reasonable to provide evidence that an event did not happen by chance. Moreover, is it not also reasonable to desire research that is meaningful or practical and an event that is replicable?

Statistical Significance Tests

Thompson (1994) asked what does the concept of statistical significance testing mean? "Too few researchers understand what statistical significance testing does and doesn't do, and consequently their results are misinterpreted" (p. 1). Statistical significance tests determine whether or not a difference exists between variables (Rea & Parker, 1997).

To fully understand the concept of statistical significant testing, a review of Fisher's single binary null hypothesis is warranted. The null hypothesis (H_0) implies that there is no difference in the two population means. Researchers such as Bakan (1966), Cohen (1988), Hinkle, Wiersma, & Jurs (1994) have called this difference, the hypothesis of no relation or no difference (cited in Nix & Barnette, 1998). At this point, it should be noted that Fisher did not develop or support the alternative hypothesis (Nix & Barnette, 1998). Further development of

Fisher's null hypothesis resulted in the null hypothesis indicating direction (e.g., $\mu_1 \leq \mu_2$ or $\mu_1 \geq \mu_2$). Conversely, the research question or the alternative hypothesis (H_1) indicates that there is a difference between two population means (e.g., $\mu_1 \neq \mu_2$) and this hypothesis may also be directional (e.g., $\mu_1 > \mu_2$ or $\mu_1 < \mu_2$).

To correctly interpret the results of null hypothesis significance testing, an understanding of the two types of inferential error that might occur, based on Fisher's p-value as the strength of the statistic developed by Neyman and Pearson, is needed (Nix & Barnette, 1998). A Type I error involves rejecting the null hypothesis when the null hypothesis is in fact true (a false positive, *e.g.*, the treatment was effective when it was not). The probability of making a Type I error is equal to the value of the researcher's selected alpha (α) level. If the researcher chooses an alpha level equal to .05, the probability of committing a Type I error is five times out of one hundred. Therefore, as the researcher lowers the alpha level, the probability of committing a Type I error is lowered. However, as the researcher lowers the probability of committing a Type I error, the researcher then sacrifices the power of the test.

The power of the test ($1-\beta$) "is the probability that a test statistic will find statistical significance" (Rossi, 1997, p. 177, cited in Nix & Barnette, 1998). Pearson and Hartley (1951) developed power charts to aid the researcher (cited in Hinkle & Oliver, 1983). A test with power of .80 indicates the researcher would have an 80 percent chance of finding statistical significance. Since power is defined as $1-\beta$, beta (β) represents Type II error. When the researcher accepts the null hypothesis and the null hypothesis is false, a false negative results (*e.g.*, no treatment effect present when there was).

Effect Magnitude Measures

Awash in a sea of terminology, researchers use different terms to refer to effect magnitude measures as effect size, percent of variance accounted for, strength of association, measure of association, relative treatment magnitude, or magnitude of effect (Plucker, 1997). Effect magnitude measures (Nix & Barnette, 1998) can be classified first as measures of strength of association. "Measures of association reflect the strength of the relationship between two or more variables. They are single-summary statistics that augment the analysis of contingency tables and provide information to supplement the results of statistical significance tests" (Rea & Parker, 1997; see also Hinkle & Oliver, 1983). Furthermore, the magnitude of the effect statistic tells the researcher the degree to which the "dependent variable is controlled, predicted, or explained by the independent variable" (Mahadevan, 2000, p. 19). Secondly, effect magnitude measures can be classified as measures of effect size involving differences between group means. "Any mean difference index, estimated effect parameter indices, or standardized difference between means qualify as measures of effect size" (Nix & Barnette, 1998, p. 8). Together, measures of strength of association and measures of effect size provide the consumer of the research with the practical significance of the research. Robinson and Levin (1997) succinctly stated "First convince us that a finding is *not due to chance*, and only then, assess how *impressive* it is" (cited in McLean & Ernest, 1998, p. 18, italics in original).

Statistical Significance Tests vs. Effect Magnitude Measures

Objections to null hypothesis statistical testing (NHST) "have provided compelling evidence that NHST has serious limiting flaws that many educators and researchers are either unaware of or have chosen to ignore" (Nix & Barnette, 1998). Debate over the value of statistical significance tests center around three areas of criticism: 1) the logic of null hypothesis testing; 2) the interpretation of null hypothesis statistical tests; and 3) the use of alternative and/or supplementary methods of inference testing (Ernest & McLean, 1998, see also Daniel, 1998a,b; Knapp, 1998; Levin, 1998; Nix & Barnette, 1998; Thompson, 1998).

Arguing vehemently against the logic of NHST (H_0: μ_1-$\mu_2 = 0$), Bakan (1966) stated, "A glance at any set of statistics on total populations will quickly confirm the rarity of the null hypothesis in nature" (p. 5, cited in Nix & Barnette, 1998). Nix and Barnette (1998) reiterated this point, "The test of differences in NHST posits an almost impossible situation where the null hypothesis differences will be exactly zero" (p. 5). If in a study, failure to reject the null hypothesis results, the researcher is faced with a double-edged sword. One edge of the blade says either Bakan and Cohen are correct about NHST or the researcher must return to examine errors in NHST, where as these errors may include treatment differences, measurement error, and/or sampling error. As a result, many researchers have found that by increasing sample size, their findings have a greater chance of resulting in statistical significance and thus, the likelihood of a published manuscript. Here is where the researcher gets cut on the other side of the blade. If the researcher increases the power of the test, it becomes increasingly more difficult to detect statistical significance. However, if the researcher increases the sample size to achieve a higher level of power, any differences thus become statistically significant no matter how small. To counterbalance this dilemma, proponents of effect magnitude measures encourage reporting measures of association or effect size to reveal whether the results yield a practical significance.

Maxwell, Camp, & Arvey (1981) suggested the "primary advantage of measures of strength of association is that they have the potential to reveal whether a statistically significant result reflects a meaningful rather than a trivial experimental effect" (p. 525). Critics see statistical significance testing as nothing more than a numbers game where researchers are only concerned with reporting only statistically significant results even when the results were not of any practical importance (Daniel, 1997; see also Fan, 1999; Hess & Olejnik, 1997; Hinkle & Oliver, 1983; McLean & Kaufman, 1998; Thompson, 1987; Vacha-Haase & Nilsson, 1998).

When researchers solely rely on statistical significance testing, either using the observed significance level (p-value) or test statistics like F, t, or χ^2, the researcher may be distracted from more important considerations like result importance or value, result replicability, and result magnitude or effect (McLean & Ernest, 1998; Thompson, 1999, March). Thompson and Snyder (1997) described researchers use language like "significance" when they meant "statistically significant" resulting in misleading uses of the wording. Brewer (1972) found that journals in behavioral sciences tended to overwhelmingly report "significant" results to mean a rejection of the null hypothesis even with a small effect size. "The implication of this response is that regardless of how small the effect is, they want to detect it, i.e., small ES"

(p. 394). Thompson (1987) reported reliance on statistical significance testing has inadvertently led to a bias against reporting statistical non-significant results thereby creating misinterpretations of statistical significant results (see also Hetrick, 1999).

Addressing the interpretation of NHST, Plucker (1997) conceptualized the misinterpretations of statistical significance testing as analogous to standing on the edge of a deep chasm. If an individual desires to cross the chasm (*e.g.*, the p-level), it is therefore important to the individual to find out the size of the chasm (*e.g.*, the effect size) before crossing. Is the chasm 10 inches or 100 feet? Plucker explained that determining the chasm's existence is important, but by doing so provides no information about the size of the chasm. Therefore, researchers reporting the relationship between the independent and dependent variables will allow the consumer of the research to determine the "practical significance" of jumping over the chasm (see also Daniel, 1997; Fan, 1999; Keppel, 1991; Kieffer & Thompson, 1999).

Lastly, the use of alternative and/or supplementary methods of inference testing can be best described by the statistician's motto, "In God we trust. All others bring data" (Claypool, 2001). Researchers arguing against statistical significance tests state that not enough information is being provided to the consumer of the research. Nix and Barnette (1998) reported researchers failed to tell readers if the assumptions of a statistical test have been satisfied or tested. "For research to be valuable it must be precise and as unambiguous as possible so that is (sic) can be compre-hended (sic) by practitioners as well as other researchers" (p. 56). Thompson (1995, November) reported that when statistical significance was obtained, many researchers simply concluded the analysis. However, the analysis should continue to determine if the statistical significance was due to sampling error or effect size (cited in Nix & Barnette, 1988).

In fairness to proponents of statistical significance tests, Levin (1998) shouted, "Show me the data!" with respect to reporting effect sizes (p. 46). As Levin pointed out, if reporting effect sizes are going to change the world, then the researcher is remiss not to report any biases inherent in the researcher when reporting statistics.

Purpose/Objectives

The purpose of this study was to describe the reporting practices of effect magnitude measures and statistical significance testing within quantitative research manuscripts published in the *Journal of Agricultural Education* during 1996-2000. It was also the purpose of this study to determine the relationship between effect magnitude measures and statistical significance testing within quantitative research manuscripts published in the *Journal of Agricultural Education* during 1996-2000. To accomplish the purpose of this study, the following objectives were established:

1) To describe reporting practices of effect magnitude measures within quantitative research manuscripts published in the *Journal of Agricultural Education* during 1996-2000.
2) To describe reporting practices of statistical significance testing within quantitative research manuscripts published in the *Journal of Agricultural Education* during 1996-2000.

3) To determine the relationship between reporting practices of effect magnitude measures and statistical significance tests within the *Journal of Agricultural Education* during 1996-2000.

Methods

The population of this descriptive study included all 171 manuscripts published in the *Journal of Agricultural Education* during 1996-2000. All published manuscripts were classified via a dichotomous key (see Figure I). Each manuscript was content analyzed with respect to the type of research. Subsequently, manuscripts classified according to relational (sample survey) or experimental research were solely used. In addition, only quantitative manuscripts were germane to this study (n = 141). If a manuscript consisted of qualitative and quantitative research, the manuscript was coded as quantitative. Further examination of the manuscripts involved an analysis of statistical significance and a measure of strength of the association.

Was the manuscript a relational or experimental study?

No → Yes

Was the manuscript qualitative or quantitative?

Qualitative → Quantitative

Did the manuscript use statistical significance tests?

No → Yes

Did the manuscript report any effect sizes?

No Yes

Figure I. Dichotomous key used to classify quantitative research manuscripts in the *Journal of Agricultural Education*.

Analysis of Data

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 8.0. A 2 x 2 Chi square (χ^2) test of significance and the Yates' correction for continuity were used to test the frequency differences. An unbiased estimator for measures of association, phi (ϕ), was used to measure the strength of the association due to each variable containing only two categories. Interpretation of phi (ϕ) was based on Rea and Parker (1997). Measures of strength of the association were interpreted as negligible (.00 to .09), weak (.10 to .19), moderate (.20 to .39), relatively strong (.40 to .59), strong (.60 to .79), and very strong (.80 to 1.00). The probability of committing a Type 1 error was set at .05, *a priori*.

Results

Objectives 1 and 2

From the 171 manuscripts published in the *Journal of Agricultural Education* during 1996-2000, 149 manuscripts consisted of a relational or experimental design, which accounted for 87.1 percent of the total manuscripts published. The remaining 22 manuscripts consisted of distinguished lectures, research syntheses of literature, or philosophical concerns which accounted for 12.9 percent. From these 149 manuscripts, eight manuscripts utilized solely qualitative research methods, which accounted for 5.4 percent. The remaining 141 manuscripts utilized quantitative research methods or a combination thereof, which accounted for 94.6 percent. From the 141 quantitative research manuscripts, 65 manuscripts utilized statistical significance tests, which accounted for 46.1 percent. Thus, the remaining 76 manuscripts utilized no statistical significance tests, which accounted for 53.9 percent. At 95 percent confidence, the data indicated that the proportion of all manuscripts will utilize statistical significance tests was between 38.7 percent to 53.5 percent ($t_{(.05, 141)} = 1.645$). From the 141 quantitative research manuscripts again, 41 manuscripts reported one or more effect magnitude measures, which accounted for 29.1 percent (see Table I for the frequency and type of effect magnitude measures reported). Therefore, the remaining 100 quantitative research manuscripts reported no effect magnitude measures, which accounted for 70.9 percent. At 95 percent confidence, the data indicated that the proportion of all manuscripts will report effect magnitude measures was between 21.7 percent to 36.5 percent ($t_{(.05, 141)} = 1.645$).

Table I

Frequency and type of effect magnitude measures reported in the *Journal of Agricultural Education* during 1996-2000

Type	Frequency
Spearman Rho	5
Pearson Product Moment	24
R^2	5
R^2 adjusted	10
eta^2	1
phi (ϕ)	4
Cramer's V	1
canonical correlation	4
point biseral	11
Hodges' g	1

Objective 3

The total numbers of manuscripts utilizing statistical significance tests that reported one or more type of effect magnitude measure were 29 manuscripts. The total number of manuscripts utilizing statistical significance tests, but did not report any type of effect magnitude measure were 36 manuscripts. The total numbers of manuscripts not utilizing statistical significance tests, but reported one of more type of effect magnitude measures were 12 manuscripts. The total numbers of manuscripts not utilizing statistical significance tests that reported no type of effect magnitude measures were 64 manuscripts (see Figure II). A 2x2 Chi square (χ^2) test of significance and a Yates' correction for continuity showed a statistical significant difference between effect magnitude measures and statistical significance tests [$\chi^2(1, N = 141) = 12.753$, $p < .000$, $\phi = .316$]. The amount of variation accounted for between variables was 31.6 percent, representing the strength of association as moderate between effect magnitude measures and statistical significance tests. Furthermore, the data indicated at 95 percent confidence that the proportion of all manuscripts utilizing statistical significance tests was greater than the proportion of all manuscripts reporting effect magnitude measures by eight percent to 26 percent ($t_{(.05, 141)} = 1.645$). Lastly, the data indicated at 95 percent confidence that the proportion of all manuscripts utilizing statistical significance tests and reporting effect magnitude measures was 15.3 percent to 25.9 percent ($t_{(.05, 141)} = 1.645$).

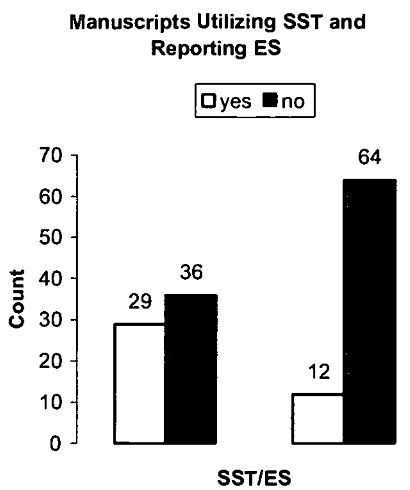

Figure II. Manuscripts utilizing statistical significance test and reporting effect sizes.

Conclusions

Conclusions of the findings indicated most manuscripts published in the *Journal of Agricultural Education* during 1996-2000 involved relational or experimental methods. In addition, quantitative research designs permeated most manuscripts. Statistical significance testing was utilized in almost half of the manuscripts to determine differences among variables. However, over half of manuscripts utilizing statistical significance tests did not include any type of effect magnitude measures to support a practical significance of their findings to the reader. This finding supported Plucker's (1997) findings about the absence of effect size estimates when statistical significance tests were used within three different research journals in gifted educational research. In addition, this finding also contrasted Robinson and Levin (1997) when these manuscripts first convinced the reader that the finding was not due to chance and then failed to show the reader how impressive the study was (cited in McLean & Ernest, 1998).

An overwhelmingly proportion of manuscripts, reporting one or more types of effect magnitude measures, utilized no statistical significant tests. This finding concurred with Carver (1978), Meehl (1978), Scmidt (1996), and Shulman (1970) who advocated the complete abandonment of statistical significance testing as a method of evaluating statistical results (cited in Daniel, 1998). Furthermore, the findings of this study showed that the proportion of all manuscripts utilizing statistical significance tests was greater than the proportion of all manuscripts reporting effect magnitude measures. The findings also indicated that the proportion of all manuscripts utilizing statistical significance tests in conjunction with reporting effect magnitude measures was limited to a quarter of the manuscripts published or less.

Recommendations

The following recommendations were based on the results of this study:

1. If the goal of scientific inquiry is to determine if the results of a test have any practical importance, it is recommended that all quantitative research utilizing statistical significance testing report an effect magnitude measure to highlight the distinction between statistical and practical significance.
2. The adoption and enforcement of more strict editorial policies regarding the reporting of the results of statistical significance testing and effect magnitude measures will perhaps eventually move the field toward improved practice. Editorial policies in the *Journal of Agricultural Education* should (a) require authors to index results of statistical significance tests to sample size, (b) require effect magnitude measures with statistical significance tests, (c) encourage Type II error analyses and confidence intervals, and (d) in cases of statistically non-significant results researchers should consider conducting statistical power analyses (Daniel, 1998b).
3. It is further recommended that readers of this paper review many of the citations made to achieve a full understanding between the debate of statistical significance tests and effect magnitude measures. Numerous effect magnitude measure formulas are available in Fern & Monroe (1996), Hetrick (1999), and Thompson (1999, in press).
4. Because "researchers are slow to adopt approaches in which they were not trained originally" (McLean & Ernest, 1998, p. 16), it is recommend that Agricultural Education researchers periodically review statistical methods. Miller (1998) suggested that if statistics are the tools of the researcher, we, as researchers then need to know our tools. "Tractor mechanics, artists, and masons have their tools and they must know how to use them. We, likewise, need to know how to use ours. You are challenged to get "checked-out" again on your tools; that is, devote some of your personal in-service or professional development time to renewing, maintaining, and improving your skills" (p. 1).

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Structuring Agricultural Education Research Using Conceptual and Theoretical Frameworks

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Abstract

The purpose of this study was to examine the degree to which agricultural education research has adhered to a structured approach over the past decade. Specifically, the study sought to determine the types of research conducted in agricultural education, the extent to which researchers used conceptual and theoretical frameworks, the extent to which conclusions addressed conceptual and/or theoretical frameworks, and to assess how the formation and use of conceptual and theoretical frameworks had changed over the past decade.

The conceptual framework of this study was developed from studies by Buriak and Shinn (1989, 1993), Radhakrisna and Xu (1997), Silva-Guerrero and Sutphin (1990), and Warmbrod (1986). In those works agricultural education research was described as being soft, lacking in rigor, without focus, of limited scholarship and/or importance, and considered by some to be inferior to research conducted in other disciplines. The theoretical framework for this analysis lies in Dewey's Steps in Reflective Thinking, as adapted by Ary, Jacobs, and Razavieh (1996) and supported by Lincoln and Guba (1995). Ary, et al. and Lincoln and Guba proposed that there is a method of inquiry to which all researchers should adhere, whether their philosophy of investigation is qualitative or quantitative by nature.

The researchers evaluated all research articles published in the *Journal of Agricultural Education* from 1990 through 1999, using a researcher-developed instrument with an inter-rater reliability of $\underline{r} = .99$. Findings revealed that the majority of the research conducted in agricultural education over the past decade has been quantitative, applied, survey research. Only 29% of the articles reviewed cited an appropriate theoretical framework. However, over 87% cited an appropriate and clear conceptual framework. It was found that researchers cited a limited number of references in establishing conceptual and theoretical frameworks, and often failed to relate their findings back to those frameworks. Selection and use of theoretical frameworks improved over the decade, although the number of studies with appropriate frameworks was still considered low. Articles accepted to the journal exhibited less well-developed conceptual frameworks as the decade progressed. It was recommended that agricultural education researchers work more rigorously to develop clear and appropriate conceptual and theoretical frameworks.

Introduction/Theoretical Framework

The future of agricultural education depends upon many variables, not the least important of which is the acquisition and application of new knowledge generated from research. However, the quality of research in agricultural education has often been questioned. Throughout the past two decades it has been criticized as being without focus, of limited scholarship and/or importance, and considered by some to be inferior to research conducted in other disciplines (Buriak & Shinn, 1993; Radhakrisna & Xu, 1997; Silva-Guerrero & Sutphin, 1990; Warmbrod, 1986). Buriak and Shinn (1989) reported agricultural education research to be perceived by external decision makers (i.e., Deans of Education, Deans of Resident Instruction in Agriculture, Experiment Station Directors) as "soft," without clearly defined objectives, and lacking in rigor. Furthermore, Buriak and Shinn (1993) reported internal perceptions to be similar to those of the earlier study involving external decision makers.

The perceived orientation of agricultural educational professionals appears to be toward teaching and service rather than research (Buriak & Shinn, 1989). Newcomb (1990) noted that in many cases university faculty prefer to teach, advise, design curricula, and work with people – only conducting research to the extent necessary "to get by" (p. 2). Newcomb suggested that research in agricultural education become more focused, coordinated, and conducted with a "passionate vision" (p. 8). Crunkilton (1988) suggested that a framework be developed to show researchers where they have been, and where they can and should go.

The theoretical framework for this analysis of research lies in Dewey's Steps in Reflective Thinking, better known as the scientific method (Newcomb, McCracken, & Warmbrod, 1993), as adapted by Ary, Jacobs, and Razavieh (1996). Ary, et al. proposed that there is a "method" of inquiry to which all researchers should adhere in investigating phenomena of interest. Likewise, Lincoln and Guba (1985) noted that even naturalistic studies have a "pattern of flow" that "builds upon…tacit knowledge" and "propositional knowledge," and "uses methods appropriate to humanly implemented inquiry" (p. 187).

Ary, et al. (1996) further proposed that in addition to the accepted steps of the scientific method, research should also be evaluated based upon the assumptions made by scientists, attitudes of scientists in controlling for bias, and formulation of scientific theory. Adapted to this study, this framework suggests that there are models to which all agricultural education research can and should adhere. Specifically, the models encompass a structure by which <u>all</u> research should be based upon philosophy, purpose, and method, and grounded in <u>both</u> a conceptual and theoretical framework – either in its inception or conclusion.

Miller (1998) cautioned that researchers need to be "green and growing" (p. 1) and therefore continue to refine their research skills, much as a mechanic would hone his or her skills. To do so means that researchers should devote time to maintaining and/or improving skills – to re-focus their attention to minor details that often are overlooked as research techniques approach automatic skill transfer status. This study seeks to determine the extent to which researchers in agricultural education are using those skills to conduct scholarly research.

Purpose/Research Questions

Buriak and Shinn (1993) noted that human beings are set apart by their ability to solve problems – to conduct research. Ary, et al. (1996) emphasized the need to follow a systematic procedure in conducting this research. How well does agricultural education research follow a specified procedure? The purpose of this study was to examine the degree to which agricultural education research has adhered to a structured approach over the past decade. The study was guided by the following research questions:

1. What types of research have been conducted in agricultural education?
2. To what extent did researchers use conceptual and theoretical frameworks?
3. To what extent did the conclusions address the conceptual and/or theoretical frameworks used?
4. How has the formation and usage of conceptual and theoretical frameworks in agricultural education research changed over the past decade?

Methods/Procedures

Research conducted and reported in the *Journal of Agricultural Education* over the past decade was reviewed by the researchers and classified as to philosophy (quantitative or qualitative), purpose (basic, applied, or action), and the methods employed to conduct the research. Articles were also evaluated for their effective use of conceptual and theoretical frameworks. The *Journal of Agricultural Education* was selected because it is the premier refereed outlet for current published research in agricultural education.

The researchers evaluated all research articles published in the 40 volumes of the *Journal of Agricultural Education* during the 10-year period from 1990 through 1999. Articles were evaluated using an instrument developed by the researchers. Content validity of the instrument was established by a panel of six land grant university faculty in agricultural education. Inter-rater reliability on the instrument was established at $\underline{r} = .99$.

Journal articles were coded and reviewed for the following components:

- Extent to which the researcher(s) developed a conceptual framework
- Extent to which the researcher(s) developed a theoretical framework
- Extent to which theory was generated (if research was basic by purpose)
- Number of citations used to establish the conceptual framework
- Number of references cited
- Number of research references cited
- Extent to which the researcher(s) used citations to tie conclusions to the literature base
- Classification of research by philosophy, purpose, and method

Data were analyzed using descriptive statistics, including measures of central tendency and dispersion.

Philosophy of Research

According to Gall, Borg, and Gall (1996), researchers have different epistemological assumptions about the nature of scientific knowledge and how to acquire it. As a result of these differences, research is categorized into two groupings based upon the philosophy of the researcher. Those two categories are positivistic (*quantitative* research) and post-positivistic (*qualitative* research). Quantitative researchers collect numerical data on observable behavior and analyze that data using numerical analysis. Qualitative researchers, on the other hand, believe that research is best constructed as interpretations by individuals and that these interpretations are transitory, situational, and analytically inductive (Gall, et al.).

Wardlow (1989) classified research based upon philosophy into three categories: positivistic mode, interpretive mode, and critical science mode. The positivistic mode in Wardlow's classification corresponds to the quantitative grouping, whereas the interpretive and critical science modes correspond to the qualitative classification used by Gall, Borg, and Gall (1996).

Purpose of Research

In addition to distinction based upon the philosophy of the researcher, studies can also be classified by type based upon the purpose for which the research was done. Whereas different names are used to describe these groupings, the operational terms used in this study are "basic," "applied," and "action" research (Ary, et al., 1996).

Basic research is that research conducted in an original area of inquiry, to generate new knowledge, or for the formulation of theory. The primary concern of this type of research is the discovery of knowledge for the sake of knowledge (Ary, et al., 1996). Ary, et al. defined basic research as having the aim of expanding "the frontiers of knowledge without regard to practical application" (p. 26). For example, Piaget's initial work and genesis of his theory of intellectual development was basic research (Kolb, 1984). Rosenshine and Furst offered another often-cited example of basic research in their Principles of Learning (Rosenshine & Furst, 1971).

Whereas basic research generates new knowledge, most educational research is conducted to test or expand that knowledge. This type of research, *applied*, expands upon existing theory and aims to solve specific problems. Whenever theories are generated, research either confirms or rejects the accuracy of those theories as they relate to particular variables under study. As may be surmised from Rosenshine and Furst's Principles of Learning (Rosenshine & Furst, 1971), there is not always a distinguishing line between basic and applied research. While there is currently an effort by some authors to merge the two categories, that union has not yet occurred. Therefore, for this study the two are treated as separate entities.

Action research is defined by Leedy (1997) as "a type of applied research that focuses on finding a solution to a local problem in a local setting" (p. 111), has specific application, and involves the decision-maker in conducting the research. For example, testing the effectiveness of a recruitment activity for the purpose of improving student recruitment in a particular college of agriculture is action research.

Research Method

Research is further categorized based upon the method employed to conduct the study. Whereas several classification systems are in place (Ary, et al., 1996; Gall, et al., 1996; Isaac & Michael, 1990; Leedy, 1997; Van Dalen & Meyer, 1979), for the purpose of this analysis methods have been categorized into eight groups: Holistic (also referred to as qualitative), Historical, Survey, Correlational, Ex post facto (Causal-comparative), Experimental (includes Pre-experimental, Quasi-experimental, True Experimental), Delphi, Evaluation.

Conceptual versus Theoretical Frameworks

Several researchers have advocated the use of strong conceptual and/or theoretical bases in agricultural education research (Buriak & Shinn, 1989; Lee, 1985; Silva-Guerrero & Sutphin, 1990; Wardlow, 1989; Williams, 1997). However, the two terms – "conceptual framework" and "theoretical framework" – are likely the two most misunderstood and misused terms in agricultural education research today. As such, the two terms are often erroneously interchanged.

A *conceptual framework* builds a structure or "concept" of what has been learned in a particular area of study. Conceptual frameworks are similar to standard literature reviews in that the conceptual framework lists the important research that has been conducted in a particular area. It goes beyond a simple literature review, however, in that it truly builds a "framework" of research. That is, it structures the literature in such a manner as dictated by the researcher to best explain the natural progression of research for the phenomenon under study (Ary, et al., 1996).

By contrast, a *theoretical framework* is a framework for explanations about the phenomenon being investigated (Gall, et al., 1996). The theory itself is defined by Gall, et al. as "an explanation of a certain set of observed phenomena in terms of a system of constructs and laws that relate these constructs to each other" (p. 8). Piaget's theory of intellectual development is an example of a theoretical framework. It has shaped educational curricula and formed a basis for multitudes of studies to better understand and utilize the theory. Other examples include Fishbein and Azjen's theory of attitudinal influence (Fishbein & Ajzen, 1975) , Vroom's expectancy theory of human motivation (Vroom, 1964), Rosenshine's explicit teaching model (Rosenshine, 1986), Mitzel's model for the study of classroom teaching (Duncan & Biddle, 1974), and Witkin's theory of cognitive styles (Witkin, 1973).

Results/Findings

Question 1: *What types of research have been conducted in agricultural education?*

Most of the research conducted in agricultural education over the past decade has been quantitative, applied, survey research. As noted in Table 1, of the 348 articles evaluated, 290 (83.3%) were classified as quantitative research. Only 12.1% of the research conducted and published in the *Journal of Agricultural Education* over the past decade was determined to be qualitative. The remaining 4.6% of the studies used a combination of quantitative and qualitative designs.

When categorized by the purpose of the research, 315 articles (90.5%) were determined to be applied research, 23 (6.6%) were action research, and the remaining 10 articles (2.9%) were basic research. When classified as to the method employed to conduct the research, 189 studies (54.3%) used a survey method. Correlational studies accounted for 58 articles (16.7%), followed by Experimental ($\underline{n}$ = 35, 10.1%), Holistic ($\underline{n}$ = 19, 5.5%), Ex post facto ($\underline{n}$ = 15, 4.3%), Historical ($\underline{n}$ = 14, 4.0%), Delphi ($\underline{n}$ = 13, 3.7%), and Evaluation ($\underline{n}$ = 5, 1.4%).

Table 1

Classification of Research by Philosophy, Purpose, and Method

			No. of Citations		No. of References	
Type of Research	f	%	Conceptual-Theoretical Framework M	Conclusions M	Cited in Reference Section M	Research Based M
Philosophy						
Quantitative	290	83.3	14.38 (7.90)	2.53 (3.48)	14.81 (6.13)	6.69 (4.55)
Qualitative	42	12.1	8.45 (7.27)	.76 (1.38)	18.88 (11.32)	9.36 (13.17)
Both Types	16	4.6	10.06 (5.48)	1.13 (1.89)	11.88 (4.21)	4.06 (3.07)
Purpose						
Basic	10	2.9	7.10 (6.71)	.30 (.67)	15.20 (6.88)	4.10 (3.21)
Applied	315	90.5	13.51 (7.98)	2.22 (3.25)	15.13 (7.11)	6.94 (6.40)
Action	23	6.6	15.70 (7.41)	3.48 (4.07)	15.65 (6.29)	7.43 (5.20)
Method						
Survey	189	54.3	13.58 (8.03)	2.06 (2.94)	13.64 (5.89)	6.07 (4.08)
Correlational	58	16.7	16.14 (8.06)	3.84 (3.77)	16.52 (5.68)	7.41 (4.62)
Experimental	35	10.1	14.69 (6.52)	2.09 (3.34)	17.29 (6.14)	7.40 (4.63)
Holistic	19	5.5	9.42 (7.46)	1.00 (1.41)	16.84 (10.08)	7.16 (9.86)
Ex Post Facto	15	4.3	16.53 (8.89)	2.73 (4.67)	17.40 (5.57)	9.33 (6.25)
Historical	14	4.0	5.36 (4.27)	.36 (.84)	23.57 (14.01)	14.00 (18.61)
Delphi	13	3.7	9.15 (3.63)	.62 (1.66)	12.69 (3.40)	12.69 (3.40)
Evaluation	5	1.4	10.00 (7.87)	5.00 (7.91)	12.00 (12.27)	7.60 (12.03)
Totals	348	100.0	13.47 (7.99)	2.25 (3.29)	15.16 (7.03)	6.89 (6.27)

Note. Standard deviations are in parentheses.

Question 2: *To what extent did researchers use conceptual and theoretical frameworks?*

As indicated in Table 2, a vast majority of the articles reviewed (87.1%) cited an appropriate and clear conceptual framework. Only nine of the accepted articles (2.6%) had no conceptual framework. The remaining 36 articles (10.3%) displayed an attempt at creating a conceptual framework, but the review of literature was deemed so weak that a clear conceptual framework could not be discerned.

Theoretical frameworks were less well developed. Only 29% of the articles reviewed cited an appropriate theoretical framework. The remaining articles either failed to develop a framework (50%), or attempted to establish a framework, but the result was unclear (21%).

As noted in Table 3, larger percentage of quantitative studies than qualitative studies (89%, 76.2%, respectively) cited and developed an appropriate conceptual framework organized around the existing research base. Nine studies were published with no conceptual framework.

Interestingly, four of the nine studies were classified as applied research – the type of research that necessitates building upon an existing research base.

Table 2

Extent to Which Conceptual and Theoretical Frameworks Were Established

Degree to Which Established	Conceptual Framework		Theoretical Framework	
	f	%	f	%
None	9	2.6	174	50.0
Attempted to establish, but result was unclear	36	10.3	73	21.0
Cited and developed appropriate framework	303	87.1	101	29.0
Totals	348	100	348	100

Table 3

Extent of Use of Conceptual and Theoretical Frameworks in Qualitative and Quantitative Studies

Degree to Which Established	Quantitative				Qualitative			
	Conceptual Framework		Theoretical Framework		Conceptual Framework		Theoretical Framework	
	f	%	f	%	f	%	f	%
None	4	1.4	143	49.3	5	11.9	25	59.5
Attempted to establish, but result was unclear	28	9.6	55	19.0	5	11.9	9	21.4
Cited and developed appropriate framework	258	89.0	92	31.7	32	76.2	8	19.1
Totals[a]	290	100	290	100	42	100	42	100

[a] Does not include studies that used both quantitative and qualitative philosophies.

Both qualitative and quantitative studies failed to develop adequate theoretical frameworks. Only 19.1% of the qualitative studies, and 31.7% of the quantitative studies cited and developed adequate theoretical frameworks. It should be noted that according to Lincoln and Guba (1985), post-positivistic research often generates theory rather than requiring that a study be built around existing theory. However, only eight of the 42 qualitative articles either cited an adequate theoretical framework or generated appropriate theory as stated by Lincoln and Guba. Likewise, only 92 of the 290 quantitative articles either cited an adequate theoretical framework, or properly developed the study around existing theory.

Basic research articles were more frequently missing a theoretical framework than were either applied or action research. Of the ten basic research articles reviewed, nine had unclear or non-existent theoretical frameworks. This is to be expected since a function of basic research is to generate theory rather than build upon existing models. However, 78.3% ($\underline{n}$ = 18) of the action research articles and 68.2% ($\underline{n}$ = 218) of the applied research articles possessed unclear theoretical frameworks – or indicated no framework at all. The mean number of citations used to establish the conceptual and/or theoretical frameworks was 13.47 ($\underline{SD}$ = 7.99, $\underline{Md}$ = 12). (See Table 1.)

Researchers cited a limited number of references in establishing conceptual and theoretical frameworks (Table 4). While the number of references cited is not as important as the quality of the cited research base, it is near impossible to develop a quality conceptual framework without an extensive review of literature.

Whereas some articles cited a plethora of references, others were published with very limited numbers of citations. As indicated in Table 4, a combined total of 25.6% of articles had from 0 – 10 citations. Likewise, the type of references cited contained fewer research-based references than is typical for applied research. Nearly half (49.4%) of the articles contained five or less *research* citations.

Table 4

Number and Type of References Cited in *Journal of Agricultural Education* Articles

	All Cited References		Cited *Research* References	
Number of Citations	f	%	f	%
0 – 5	21	5.9	176	49.4
6 – 10	70	19.7	112	31.5
11 – 15	113	31.7	48	13.5
16 – 20	85	23.9	10	2.8
21 – 25	42	11.8	4	1.1
More than 25	25	7.0	6	1.7

Figure 1 displays graphically the number of citations, listed in the reference section of each article. The mean number of references cited per article was 15.2 ($\underline{SD}$ = 7.03). The number of citations varied from 3 – 51, with a positively skewed distribution. The median number of references listed was 14.

Since over 90% of the articles accepted for publication were applied research, logic would dictate that a vast majority of references listed would be research-based. However, the mean number of *research* studies that authors cited was 6.9, with a positively skewed distribution. The median number of listed research references was 6.0.

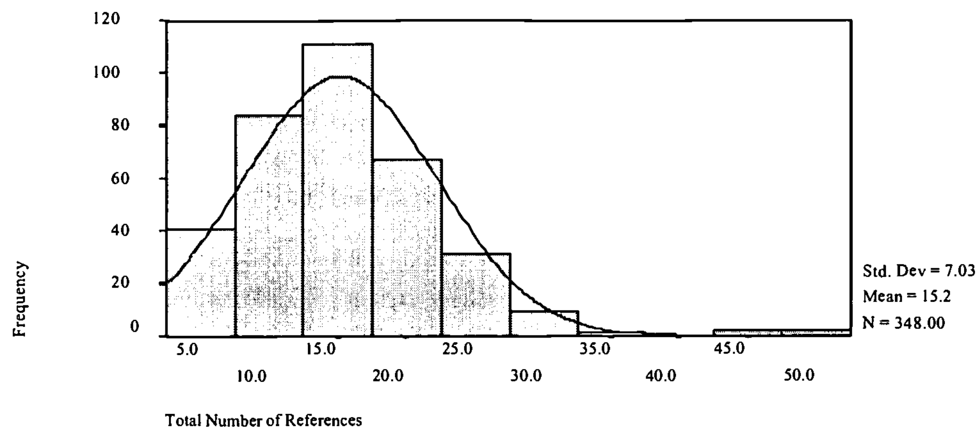

Figure 1. Number of references cited.

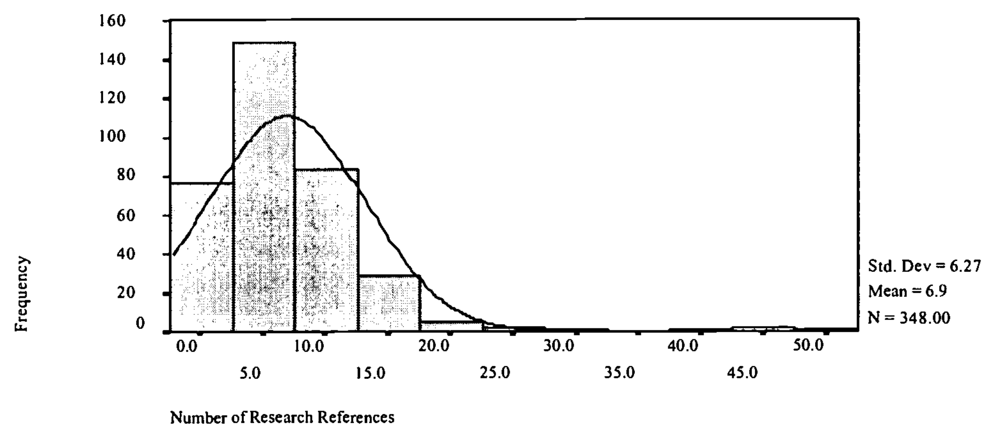

Figure 2. Number of *research* references cited.

Question 3: *To what extent did conclusions address the conceptual and/or theoretical model used?*

As presented in Table 1, the mean number of citations found in the conclusions, recommendations, and implications sections of articles was 2.25 (SD = 3.29, Md = 1). Table 5 contains data showing the distribution of citations as they were applied to the existing literature base.

Although over 90% of the articles reviewed were applied research, which should have required that researchers compare their results with those of others. Nearly one-half (47.4%) failed to compare results with at least one piece of research cited in the conceptual framework, or to the theoretical framework that supposedly guided the study. An additional 12.4% compared findings to only one piece of research.

Table 5

Number of Citations in the Conclusions, Recommendations, and/or Implications Sections of *Journal of Agricultural Education* Articles (N = 348)

	All Cited References	
Number of Citations	f	%
0	165	47.4
1	43	12.4
2	33	9.5
3	23	6.6
4	18	5.2
5	11	3.2
6	14	4.0
7	10	2.9
8	9	2.6
9	4	1.1
10 or more	18	4.0

Question 4: How has the formation and usage of conceptual and theoretical frameworks in agricultural education research changed over the past decade?

The *Journal of Agricultural Education* published 40 volumes during the ten years that comprised this analysis. To better gauge the changes taking place in the reporting of research in the publication, the decade was divided into four equal time periods consisting of 10 volumes each. As indicated in Table 6, the first quarter of the decade produced publications in which the highest percentage of articles (94.5%) cited appropriate conceptual frameworks. That percentage had dropped to 78.7% by the end of the decade. Likewise, the percentage of articles in which the researcher cited *some* research, but failed to develop a clear conceptual framework increased from 4.4% in the first quarter of the decade to 20% by the end.

Selection and use of theoretical frameworks improved from the first part of the decade, although the percentage of studies with appropriate frameworks was still low (33.3%). In the first ten issues of the journal, only 7.7% of all published articles cited appropriate theoretical frameworks. That percentage dramatically increased to 33.3% in the second quarter and to 43.8% in the third quarter of the decade. By the final quarter of the decade, however, only one-third of the articles published had appropriate theoretical frameworks.

Conclusions/Implications/Recommendations

Most of the research reported in the *Journal of Agricultural Education* over the past decade can best be classified as quantitative, applied, and survey research. Of the 348 articles evaluated, over 83% were classified as quantitative research. Based upon purpose, over 90% of the articles were determined to be applied research. When classified by method, over 54% of the articles reviewed used a survey design.

Table 6

Degree to Which Conceptual and Theoretical Frameworks Have Been Used and Reported Over Time

	Date of Publication[a]			
Degree to Which Established	1990-1993	1993-1995	1995-1997	1997-1999
Conceptual Framework				
None	1 (1.1%)	3 (2.9%)	4 (5.0%)	1 (1.3%)
Attempted to establish, but result was unclear	4 (4.4%)	11 (10.8%)	6 (7.5%)	15 (20.0%)
Cited and developed appropriate framework	86 (94.5%)	88 (86.3%)	70 (87.5%)	59 (78.7%)
Theoretical Framework				
None	67 (73.6%)	42 (41.2%)	29 (36.2%)	36 (48.0%)
Attempted to establish, but result was unclear	17 (18.7%)	26 (25.5%)	16 (20.0%)	14 (18.7%)
Cited and developed appropriate framework	7 (7.7%)	34 (33.3%)	35 (43.8%)	25 (33.3%)
Totals	91	102	80	75

[a] Journal articles were equally divided into four groups of ten volumes each, published in the years indicated.

When classified by purpose, research published in the *Journal of Agricultural Education* was almost entirely applied research. Why? Are reviewers for the journal more likely to only accept research that builds upon existing theory, or do agricultural education researchers conduct little basic or action research? Is action research deemed to be more biased because it is designed to address a problem in which the researcher is intimately involved? Do agricultural educators fail to use research-based solutions when solving their immediate problems, and therefore render those studies unpublishable? Further research directed at determining the attitudes of *Journal of Agricultural Education* reviewers toward submission criteria and/or research philosophy may be helpful in answering some of these questions. In addition, journal editors may wish to implement training seminars to assist reviewers in improving skills in critiquing submitted articles.

Researchers may have a limited understanding of the functions of, and differences between, conceptual and theoretical frameworks. Authors in over 87% of the studies analyzed had developed a clear conceptual framework. However, only approximately 20% of the published articles cited an appropriate theoretical framework. Likewise, when theoretical frameworks were cited, often they were not well connected to the research being conducted. Interestingly, both quantitative and qualitative studies often failed at either building upon, or developing, sound theoretical frameworks. Approximately 81% of the published qualitative studies and over 68% of the quantitative studies failed to focus the inquiry around theory explanation or development, or the study exhibited a theoretical framework that was poorly developed. Has the profession heeded the warnings of Buriak and Shinn (1989; 1993), Silva-Guerrero and Sutphin (1990), and Warmbrod (1986)?

Researchers cited a limited number of references in establishing conceptual and theoretical frameworks – both in explanatory citations and in citations of related research. Whereas some articles cited a plethora of references, others were published with a very limited number of citations. Nearly half (49.4%) of the articles contained five or less research citations. Of those that contained more than 25 research citations, all were syntheses of research. Whereas the number and type of references cited do not ensure that a conceptual base has been established, it is difficult to develop a sound conceptual framework without an extensive review of the research base. Not only should a greater number of references be utilized, researchers should also focus on developing a *quality* review of literature. These findings further emphasize the need to improve the rigor of research in agricultural education, as called for earlier by Warmbrod (1986).

Most articles published in the *Journal of Agricultural Education* failed to tie conclusions to the conceptual and/or theoretical frameworks around which the research was conducted. Nearly 47% of the articles reviewed failed to compare research findings with even one piece of research cited in the conceptual framework, or to the theoretical framework that supposedly guided the study. Perhaps this criterion should be included as item of review when articles are critiqued.

Selection and use of theoretical frameworks improved between the first and last portions of the decade, although the number of studies with appropriate frameworks was still low (33.3%). By contrast, as the decade progressed, articles accepted to the journal tended to have less well-developed conceptual frameworks. For example, in the first quarter of the decade, 94.5% of the published articles cited appropriate conceptual frameworks. By the end of the decade that percentage had dropped to 78.7%. To predict a trend of deteriorating quality in this component of research goes beyond the scope of this investigation, but the situation warrants future attention.

Overall, research published in the *Journal of Agricultural Education* only moderately adheres to the theoretical models of Ary, et al. (1996) or Lincoln and Guba (1985) in structuring research around a model that is grounded in both a conceptual and theoretical framework. As noted by Buriak and Shinn (1989), in order to gain the respect of external decision makers, agricultural education researchers should adopt and use more rigorous research techniques. A decade later this call for rigor is still pertinent.

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THE HANDLING OF NONRESPONSE IN AGRICULTURAL EDUCATION

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Abstract

This study was designed to describe and explore how nonresponse in the *Journal of Agricultural Education* has been handled historically. All articles (N=364) published in the *Journal of Agricultural Education* during the years 1990 through 1999 were analyzed using content analysis techniques. Study findings show that not mentioning nonresponse error as a threat to external validity of a study, not attempting to control for nonresponse error, or not providing a reference to the literature were unfortunately the norm and not the exception. This study provides three statistically sound and professionally acceptable procedures and protocols for handling nonresponse: Method 1—Comparison of Early to Late Respondents; Method 2—Using "Days to Respond" as a Regression Variable; and Method 3—Compare Respondents to Nonrespondents.

Introduction

Social science research has advanced, in part, due to efforts of research designers and statisticians to produce reliable and valid techniques for the measurement of social variables. Measures of characteristics assessed using these techniques, including probabilistic sampling techniques, can be used to estimate parameters of a population. The ability of social science researchers to draw conclusions, generalize results, and make inferences to broader audiences is enhanced by the use of these techniques.

As perhaps no other single body of knowledge, advances in sample survey research methods have elevated the status of research in agricultural education over the past five decades. The consistent application of generally accepted methods in the design, conduct, analysis, and reporting of sample survey research studies has allowed our social science research to be considered on equal footing with the experimental research conducted by our colleagues in the physical and biological fields of agriculture. Requests for proposals under the latest round of the CSREES Integrated Research, Education, and Extension Competitive Grants Program (IREECGP), and Initiative for Future Agriculture and Food Systems (IFAFS) program, both of which required an educational component and an evaluation of the proposed research program's social impact, can be seen as adding to the growing body of evidence of this equal footing.

According to Dillman (2000) there are four possible sources of error in sample survey research. He calls them the "cornerstones for conducting a quality survey" (p. 9). These four are Sampling Error, Coverage Error, Measurement Error, and Nonresponse Error. As any one of these types of error increases in a survey research study, the results and recommendations of that study become increasingly suspect and decreasingly valuable as evidence of the characteristic in the target population or in other audiences.

The first of these cornerstones, Sampling Error, is a result of the measuring a characteristic in some, but not all, of the units or people in the population of interest. Sample Error always exists at some level when a random sample is drawn. It is reduced through larger samples, but cannot be eliminated completely unless one conducts a census. Sampling error is unknown when any of the methods for random selection or assignment of subjects to treatments are violated.

The second source of error, Coverage Error, exists when the list or *frame* from which the sample was drawn fails to contain all of the subjects in the population of interest. Using the dues-paying members of the AAAE to sample the population of higher education faculty in Agricultural Education would introduce Coverage Error.

Measurement Error is contained in the instrument used to collect the data. Reducing this source of error requires that the researcher use items that are valid, reliable, and unambiguous to the research subjects.

The fourth cornerstone in good survey research is the handling of Nonresponse Error. This type of error exists to the extent that people included in the sample fail to provide usable responses and are different than those who do on the characteristics of interest in the study.

Of these four types, nonresponse has perhaps received the least attention. Entire courses are available in appropriate and statistically defensible sampling techniques to address both sampling and coverage error. Other courses are devoted to the construction and analysis of survey instruments. However, little time and attention has been expended on the fourth cornerstone of quality survey research.

Eighteen years ago Larry Miller and Keith Smith wrote an article regarding nonresponse error (Miller and Smith, 1983). Miller (1998) later said, "Numerous improvements can be made in our research" (p.10), and suggested that the profession continue to devote personal time to renewing, maintaining, and improving our ability to use appropriate research methods and techniques.

The authors agree. Improving research in agricultural education requires that we periodically examine our methods and techniques. Nonresponse error should be handled through the systematic application of statistically sound and professionally accepted procedures.

Review of Cited Procedures for Handling Non-Response Error

In their widely accepted and highly cited article on handling non-response in survey research, Miller and Smith (1983) stated that Extension evaluators could use one of five general methods for controlling nonresponse error once appropriate follow-up procedures have been carried out: Ignore nonrespondents; compare respondents to population; Compare respondents to nonrespondents; compare early to late respondents; and "double-dip" nonrespondents. These authors further state that nonresponse error is a concern for response rates as high as 90%.

Gall, Borg, and Gall (1996) suggested that if, after appropriate follow-up procedures have been carried out, a response rate of less than 80% was achieved, a random sample of 20 nonrespondents should be contacted ("double-dipped"). Responses should then be compared with each item of the instrument to determine if nonresponse error is a problem. Ary, Jacobs, and Razavich (1996) noted that if, after appropriate follow-up procedures have been carried out, a response rate of less than 75% was achieved, the researcher should attempt to describe how respondents might differ from nonrespondents by comparing characteristics of respondents to those of the population, comparing early to late respondents, or comparing respondents to a small random sample of nonrespondents. Similarly, Tuckman (1999) recommended that "if fewer than about 80% of people who receive the questionnaire complete and return it, the researcher must try to reach a portion of the nonrespondents and obtain some data from them. Additional returns of all or critical portions of the questionnaire by 5 to 10% of the nonrespondents is required for this purpose" (p.267).

Examples of How Non-Response is Currently Being Handled

The following are examples of how various authors addressed nonresponse errors in articles published in the *Journal of Agricultural Education*.

Dollisso and Martin (1999, p. 41) noted that "To determine if there was a difference between the respondents and non-respondents to the written questionnaire, the researcher did a telephone follow-up survey of 22% of the non-respondents using the entire instrument. The t-test analysis indicated no significant differences between respondents and non-respondents."

With a response rate of 58%, Born and Miller (1999, p. 33) noted, "No additional follow-ups were conducted. Nonresponse error was controlled by comparing faculty with the population on known characteristics as recommended by Miller and Smith (1983)."

Allen, Frick, and Field (1995, p. 51) noted, "In addition to the 627 individuals who responded to the survey, a randomly selected sample of 20 non-responding subjects were contacted by telephone. According to Borg and Gall (1989), 20 cases are adequate to compare the responses of both groups to determine if the non-responding group was biased. Calls were made until twenty (20) individuals agreed to answer the survey over the phone."

With a response rate of 87%, Connors and Elliot (1994, p. 16) noted, "Respondents were grouped as early or late respondents. The two groups were compared on their responses to the Likert scale questions using t-tests. No differences were found between the responses of early and late respondents so the results are generalizable to the target population (Miller & Smith, 1983)."

"Because of the high response rate," Smith and Kotrlik (1990, p 14) stated, "a planned telephone follow up of nonrespondents was not conducted since a 97.8% response rate was considered adequate (Borg & Gall, 1983)."

Purpose

The purpose of this line of inquiry was to describe and explore how nonresponse in the *Journal of Agricultural Education* was handled for the years 1990 through 1999.

Specific objectives include:

1. Describe the number and type of articles published in the *Journal of Agricultural Education* during the years 1990 through 1999.
2. Describe the sampling procedures used to select research participants in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.
3. Describe the response rate of research articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.
4. Describe how often nonresponse error as a threat to external validity was mentioned in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.
5. Describe how nonresponse error was controlled for in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.
6. Describe the literature cited in handling nonresponse error for articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.
7. Describe results from attempts to control for nonresponse error in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999.

Methods

All articles (N=364) published in the *Journal of Agricultural Education* during the years 1990 through 1999 were analyzed using content analysis techniques. Data were analyzed using SPSS, and appropriate descriptive statistics were presented. Based on a review of literature, the researchers developed an instrument to collect data related to the objectives of the study (Dillman, 2000; Gall, Borg, & Gall, 1996; Fraenkel, & Wallen, 1996; Ary, Jacobs, & Razavieh, 1996; Miller, & Smith, 1983). The following seven coding categories were developed. Type of article was coded as sampling procedures used or sampling procedures not used (level of measurement=nominal). Response rate was coded as actual rate achieved (level of measurement=ratio). Mentioning of nonresponse error as a threat to external validity was coded as mentioned nonresponse, did not mention nonresponse, or 100% response rate achieved (level of measurement=nominal). How nonresponse error was handled was coded into categories (level of measurement=nominal) proposed by Miller and Smith (1983). Literature cited was coded by actual reference to the literature (level of measurement=nominal). Results of efforts to control for nonresponse errors were coded as no differences found, differences found, or did not indicate results (level of measurement=nominal). Sampling procedures used were coded as one of nine categories (level of measurement=nominal).

A panel of experts at Texas A&M University and Texas Tech University established content validity. Each article was read and analyzed independently by two of the researchers. Researcher-generated data were entered onto the data collection instrument. Results generated by the two researchers were compared to determine discrepancies between researchers. Less than one discrepancy per issue existed. When discrepancies existed the two researchers, working together, reanalyzed the data and agreed on the correct code.

Findings

The following section presents findings by objective for the years 1990 through 1999.

Objective One

The first objective was to describe the number and type of articles published. As shown in Table 1, 364 articles were published in the *Journal* during the 1990's. Approximately 84% (n=304) of articles published in the *Journal* used sampling procedures.

Table 1

Number and type of articles published in the *Journal of Agricultural Education*

Type of Article		F	%
Sampling used		304	83.5
Sampling not used		60	16.5
	Total	364	100.0

Objective Two

The second objective was to describe the sampling procedures used to select research participants and reported in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999. As shown in Table 2, the sampling procedures used most were census (44.4%), simple random sampling (15.1%), stratified sampling (15.1%), and purposive sampling (10.5%). The sampling procedures used least were cluster sampling (4.4%), Delphi sampling (4.4%), convenience sampling (3%), and systematic sampling (3%). One article did not report a sampling procedure.

Objective Three

The third objective was to describe the response rate described in research articles published by the *Journal of Agricultural Education* during the years 1990 through 1999. Table 3 shows response rates of studies published. The average response rate was 81.6% (SD=18.2). The minimum response rate reported was 28%, and the maximum was 100%. In fact, almost 30% of the studies reported that a 100% response rate was achieved. Another 30% of the studies reported response rates of 90-99% (f=34) and 80-89% (f=57).

Objective Four

The fourth objective was to describe how often nonresponse error was mentioned as a threat to external validity of the study. Table 4 shows that approximately 45% articles published in the *Journal* during the 1990s mentioned nonresponse error as a threat to external validity. For almost 30% of articles published in the *Journal*, nonresponse error was not a threat to external validity because a 100% response rate was achieved. Approximately 25% of articles did not mention nonresponse error as a threat to external validity. Of the 304 research articles published in the *Journal*, nonresponse was a threat to external validity of the findings in approximately 70% of the studies (see Table 3); that is, it was a threat to all studie s that did not achieve a 100% response rate.

Table 2

Sampling procedures used in articles published in *the Journal of Agricultural Education*

Sampling Procedure	f	%
Census	135	44.4
Simple Random Sampling	46	15.1
Stratified Sampling	46	15.1
Purposive Sampling	32	10.5
Cluster Sampling	13	4.4
Delphi Sampling	13	4.4
Convenience Sampling	9	3.0
Systematic Sampling	9	3.0
Not Reported	1	0.1
Total	304	100.0

Table 3

Response rate of research articles published in the *Journal of Agricultural Education*

Response Rate[a]	f	%
100%	90	29.6
90 – 99%	34	11.2
80 – 89%	57	18.8
70 – 79%	52	17.1
60 – 69%	31	10.2
50 – 59%	24	7.9
Less than 50%	14	4.6
Did not report response rate	2	0.7
Total	304	100.0

Note: [a]M=81.6; SD=18.2; Min=28%; Max=100%

Objective Five

The fifth objective was to describe how nonresponse error, in which nonresponse was a threat to external validity (f=214), was controlled in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999 (see Table 5). No attempts were made to control for nonresponse error in 46.7% of the articles (f=100). Twenty-five of the articles in which no attempts were made to control for nonresponse error mentioned nonresponse as a threat to external validity. Nonresponse error was controlled by comparing early to late respondents in approximately 30% of the studies. Almost 20% of the studies attempted to control for nonresponse error by following up with nonrespondents. Specific procedures for handling nonresponse varied.

Following are examples of different procedures used to compare early versus late respondents: compared early, middle, and late respondents; compared early and late respondents on scaled items; compared early and late respondents on demographic items; compared early and late respondents on scaled and demographic items; compared early (1st 2 weeks) and late (next 2 weeks) on demographic characteristics; compared early (those responses received before follow-up letter) and late (those received after 1st follow-up letter); and compared early (1st 4 weeks) and late (next 4 weeks.)

Table 4

Frequency that nonresponse error as a threat to external validity was mentioned in articles published in the *Journal of Agricultural Education*

Factor	f	%	f	%
Less than 100% response rate achieved	214	70.4		
Mentioned nonresponse	139	45.7	139	65.0
Did not mention nonresponse	75	24.7	75	35.0
Nonresponse a threat to external validity	214	70.4	214	100.0
100% response rate achieved	90	29.6		
Mention of nonresponse not necessary	90	29.6	90	100.0
Nonresponse not a threat to external validity	90	29.6	90	100.0
Total	304	100.0		

Following are examples of different procedures used to compare respondents to nonrespondents: compared 10% of nonrepondents with respondents on scaled items; compared 50% of nonrespondents with respondents on demographic items; compared 10 nonrespondents with respondents; compared 10% of nonrespondents with respondents on 15 randomly selected scale items; compared 20% of nonrespondents with respondents; and compared 25% of nonrespondents with respondents on scaled items.

Table 5

How nonresponse error was handled in articles published in *the Journal of Agricultural Education*

How Nonresponse was Handled	f	%
No attempts to control for nonresponse were mentioned	100	46.7
Compared early to late respondents	67	31.3
Followed up with sample of nonrespondents	40	18.7
Compared respondents/nonrespondents on characteristics known *a priori*	5	2.3
Compared respondents to population on characteristics known *a priori*	2	0.9
Total	214	100.0

Objective Six

The sixth objective was to describe the literature cited in handling nonresponse error for articles published by the *Journal of Agricultural Education* during the years 1990 through 1999. For studies where nonresponse error was a threat to external validity, almost 70% (f=141) did not provide a reference to the literature for how nonresponse was or should be handled (see Table 6).

Forty-eight articles (24.5%) cited Miller and Smith (1983) for how nonresponse was handled. Four articles (2%) cited Borg and Gall (1989 or 1983) for how nonresponse was handled.

Table 6

Reference to the literature of how nonresponse was or should be handled in articles published in *the Journal of Agricultural Education*

Reference Cited	f	%
No reference provided	141	69.0
Miller, & Smith, 1983	50	24.5
Borg, & Gall, 1989 or 1983	4	2.0
Goldhor, 1972	3	1.5
Dillman, 1978	3	1.0
Kingery, Bryant, Palmer, & Araghi, 1989	1	0.5
Goode, & Hatt, 1952	1	0.5
Brinkerhoff & Associates, 1983	1	0.5
Salant, & Dillman, 1994	1	0.5
Kerlinger, 1986	1	0.5
Ary, Jacobs, & Razavieh, 1996	1	0.5
Total references cited	207	100.0

Objective Seven

The seventh objective was to describe results from attempts to control for nonresponse error in articles published by the *Journal of Agricultural Education* during the years 1990 through 1999. Table 7 shows the results of efforts to control for nonresponse. Seventy-five percent of the articles published indicated there were no differences between respondents and nonrespondents and that nonresponse error was not a threat to external validity. Almost 20% of articles did not report results of efforts to control for nonresponse errors. Approximately 6% of articles (f=7) found differences between early/late respondents or respondents/nonrespondents. The results of four of the articles where differences were found were generalized to the target population. The results of three of the articles where differences were found were limited to the sample. No differences in early/late responses or respondents/nonrespondents were found when a response rate of 85% was achieved; however, this represented only eleven of the 86 articles.

Table 7

Results of efforts to control for nonresponse error in articles published in the *Journal of Agricultural Education*

Results of Effort to Control for Nonresponse Error	f	%
No difference found	86	75.4
Did not indicate results	21	18.4
Differences found	7	6.2
Total	114	100.0

Conclusions

Based on the results of this study, the following conclusions were drawn and discussion provided. To ensure the external validity or generalizability of research findings to the target population, the researcher must satisfactorily answer the question of whether the results of the survey would have been the same if a 100% response rate had been achieved (Richardson, 2000). Controlling for nonresponse error begins with designing and implementing research, following generally acceptable protocols and procedures (Dillman, 2000). Appropriate sampling protocols and procedures should be used to maximize participation in a study. Once participation has been maximized, the researcher will have obtained a high enough response rate to conclude that nonresponse is not a threat to external validity or obtained a response rate that warrants additional procedures for ensuring that nonresponse is not a threat to external validity.

Eight different general sampling procedures were used to collect data for the 304 articles published in the *Journal of Agricultural Education*. Nonresponse error can be a threat to the external validity of a study when any of these sampling procedures are used and less than 100% response rate is achieved. A 100% response rate was achieved in 90 of the articles published in the *Journal of Agricultural Education*. Nonresponse, therefore, was a threat to external validity in 214 articles. In approximately 35% of these 214 articles, nonresponse error, as a threat to external validity, was not mentioned. In almost 50% of these 214 articles, no attempts to control for nonresponse were mentioned. The external validity of those findings is, therefore, unknown.

Of the articles attempting to do so, nonresponse error was handled primarily by comparing early to late respondents or comparing respondents with a sample of nonrespondents. As described previously, specific procedures for making such comparisons varied and were not standardized. In addressing nonresponse error, researchers cited a total of 66 references to the literature. During the ten years of research covered in this paper, few differences were found to exist between early and late respondents or between respondents and nonrespondents. Only seven articles reported differences between early/late respondents or respondents/nonrespondents. Results from procedures used to address nonresponse error provide evidence that both early/late comparison and follow-up with nonrespondents are defensible and generally accepted procedures for handling nonresponse error as a threat to external validity of research findings. Early respondents were similar to late respondents, and respondents were similar to nonrespondents. Further, during the ten years of research covered in this paper, no differences were found between early and late respondents or between respondents and nonrespondent when a response rate of 85% was achieved. We tentatively conclude that additional procedures for control of nonresponse error are not necessary when a response rate of 85% is achieved.

As noted throughout this paper, not mentioning nonresponse error as a threat to external validity of a study, not attempting to control for nonresponse error, or not providing a reference to the literature were unfortunately the norm and not the exception. To ensure external validity of research findings, statistically sound and professionally acceptable procedures and protocols for handling nonresponse error are needed and should be reported. The results presented in this paper represent how nonresponse has been handled in the past. Given these results, our findings, and the literature, we propose the following procedures for handling nonresponse in the future and challenge ourselves and our colleagues to address and report more directly how nonresponse was addressed. We recommend a follow-up study of the handling of nonresponse in the *Journal of Agricultural Education* in five years to describe the outcomes of proposed procedures. We recommend replication of this study for articles published in other scholarly pub lications and in other professions to describe the generalizability of these findings to other populations and applicability of recommendations.

Proposed Procedures for Handling Nonresponse Issues

Based on the findings of this study and the review of literature, we propose the following three protocols and procedures for addressing nonresponse error as a threat to external validity of a study.

Method 1—Comparison of Early to Late Respondents. Armstrong and Overton (1977) discuss "extrapolation methods" for estimating the response of nonrespondents. Extrapolation methods are based on the concept that subjects who respond late are similar to nonrespondents (Pace, 1939). This method has been used frequently in the *Journal of Agricultural Education.* However, there is no consistent/standardized operational definition of "late respondent." One technique to operationally define late respondents is based on responses generated by "successive waves of a questionnaire. 'Wave' refers to the response generated by a stimulus, e.g., a follow-up postcard" (p.397, Armstrong & Overton, 1977). So, we recommend that late respondents be defined operationally as those who respond in the last wave of respondents in successive follow-ups to a questionnaire, that is, in response to the last stimulus. To ensure that the number of late respondents is large enough to be meaningful practically and statistically, we recommend further that the minimum number of late respondents be 30. Then, if the last stimulus does not generate 30 or more responses, the researcher should "back up" and use responses to the last two stimuli as his or her late respondents. Comparison, then, would be made between early and late respondents on primary variables of interest. Only if no differences are found should results be generalized to the target population. On the other hand, if differences are found, those differences should be described and limitations in generalizing should be noted. Discussions of differences should be "richly" reported to provide valuable information about populations studied in agricultural education.

If respondents cannot be categorized by successive waves or if a wave of 30 respondents cannot be defined by successive stimuli, then we recommend that late respondents be defined operationally and arbitrarily as the later 50% of the respondents. Why 50%? Any other arbitrary dichotomy of more or less than 50%, i.e., the early and late respondent groups are not equal in size, reduces the statistical power of any comparison.

Method 2—Using "Days to Respond" as a Regression Variable. Similar to the alternative above is a procedure in which "days to respond" is coded as a continuous variable, and it is used as an independent variable in regression equations in which primary variables of interest are regressed on the variable "days to respond." As in method one, this is an extrapolation method in which nonrespondents are considered to be a linear extension of the latest respondents, and a trend may be detected across respondents based on relative earliness or lateness to respond. Then, if the regression model does not yield statistically significant results, it is assumed that nonrespondents do not differ from respondents. Comparisons between respondents and differences, if found, should be handled as described above.

Method 3—Compare Respondents to Nonrespondents. Perhaps the most acceptable method historically of addressing nonresponse bias has been to sample nonrespondents, work extra diligently to get their responses, and then compare their responses to other (previous) respondents. Comparisons between respondents and nonrespondents and differences found should be handled as described above. We recommend this method be used if a minimum of 20 responses from a random sample of nonrespondents can be attained. Using fewer than 20 responses threatens the statistical power to detect differences between respondents and nonrespondents. Thus, if fewer than 20 nonrespondents are obtained, their responses could be combined with other respondents and used in conjunction with method 1 or 2.

By employing these methods, and then measuring their effectiveness, the profession will verify or refute the utility of the methods in reducing nonresponse error. These methods, further, are consistent with and supportive of Miller and Smith's (1983) landmark article on handling nonresponse error. If the three protocols and procedures (described above) for addressing nonresponse error as a threat to external validity of a study are effective, we will continue to use them; if ineffective we will have evidence of that and a deeper understanding of the problem. Whether these methods are effective or not, we will make substantial progress in reducing nonresponse error over the next 18 years.

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AGRICULTURAL EDUCATION COMPETENCIES AND PROGRESS TOWARDS A DOCTORAL DEGREE

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Abstract

This study was designed to describe the compilation of doctoral students' knowledge, skill, and abilities as they progressed towards a degree in agricultural education. A census of beginning, middle, and end of program doctoral students at Texas A&M University was conducted. An 85% response rate was achieved. Data for the study were collected by mailed questionnaire and online from the Internet. Study findings showed that as doctoral students progressed towards a degree, their Foundations Knowledge, Applications Knowledge, International Knowledge, Social Skills, Content Skills, Process Skills, Complex Problem-Solving Skills, Systems Skills, Resource Management Skills, Verbal Abilities, Idea Generation and Reasoning Abilities, Auditory and Speech Abilities, Attentiveness Abilities, and Perception Abilities increased. Recommendations for validating and authenticating study findings are provided. This study provides a model for benchmarking competencies, provides baseline data for making such changes, and provides a taxonomy from which to study and understand/consider agricultural education competencies.

Introduction

A successful agricultural education doctoral student and graduate will draw on a variety of academic fields, knowledge bases, and contextual applications to achieve his or her personal and professional goals. Further, he or she will rely on a unique bundle of knowledge, skills, and abilities that are acquired and strengthened through life experiences and education to achieve his or her personal and professional goals. For doctoral students, graduate school is an opportunity to gain not only new knowledge, but also acquire and strengthen skills and abilities needed to be professionally successful. Knowledge is a body of information, supported by professionally acceptable theory and research, that students use to perform effectively and successfully in a given setting. Skill is a present, observable competence to perform a learned psychomotor act. Effective performance of skills requires application of related knowledge and facilitates acquisition of new knowledge acquisition. Ability is a present competence to perform an observable behavior or a behavior that results in observable outcomes. Collectively, knowledge, skills, and abilities are referred to as competencies. Competencies are behavioral dimensions that help to identify effective from ineffective performance (Maxine, 1997).

In agricultural education, numerous studies have been conducted to look at specific student competencies within specific contexts. Place and Jacob (2001) found that Extension employees needed resource management competencies such as time management, workplace, and stress management to be effective. McCormick and Whittington (2000) found that students needed well-developed abilities to think critically at higher levels of cognition. Dyer and Osborne (1996) found that problem-solving skills are needed and could be taught to agricultural education students. Goecker (1992) stated that agricultural education graduate students needed, but did not possess, very high levels of teaching and learning competencies to be effective and productive professionals. It has also been shown that international graduate students have particular challenges with respect to communication and social competencies (Timko, Linhardt, & Stewart, 1991). Henderson and Shibano (1990) found that international graduate students showed the highest levels of knowledge acquisition in teacher education preparation, research methods and techniques, and program development.

Fewer studies have focused on the compilation of knowledge, skills, and abilities that influence student success (Garton, et al., 1999). Drawbaugh (1972) noted that students must be made aware of their unique competencies and subsequently provided opportunity for growth as they progress in their education. Newcomb (1974) noted that there are numerous lists of competencies in agricultural education, but that little is known about which competencies are related to success. For example, Shippy (1981) identified 246 competencies in ten categories needed by agricultural education graduates including program planning, development, and evaluation; planning of instruction; execution of instruction; evaluation of instruction; student vocational organization; supervised occupational experience; management; guidance; school-community relations; and professional role and development. Other studies have focused on a compilation of competencies needed by agricultural teachers to be successful (Stewart, Lighari, Gott, 1983; Peterson, 1983; Cook, 1963).

Findlay (1992) found agricultural education teachers acquired high levels of competencies through formal education, on-the-job experience, and self-directed study. Lower levels of competency acquisition were achieved through teaching internships and laboratory experiences. Low levels of doctoral student knowledge, skills, and abilities may result in frustration, demotivation, impeded learning, and ultimately failure for students (Lindner, Dooley, Murphy, 2001). Further, faculty may similarly become frustrated in developing and delivering course material if they are challenged by students who do not possess the requisite competencies to master course material; or faculty may be able to use this information to improve curricula, teaching materials, and instructional delivery methods.

Identifying competencies associated with higher levels of performance or goal attainment is known as competency modeling (Stone, 1997). For competency models to be effective, and because competencies can be influenced by a student's personality type, biological function, social style, and/or personal styles and values, competency models must be broad enough to allow for students to offset weaknesses on certain competencies with strengths on others (Parry, 1998). Competency models can be used: as a student recruitment and selection tool; as a student assessment tool; as a tool to develop curricula and other teaching material; as a coaching, counseling, and mentoring tool; as a career development tool; and as a behavioral requirement benchmarking tool (Yeung, Woolcock & Sullivan, 1996).

There are many models and methods for collecting the information necessary to establish a competency model. The knowledge category used in the research reported here was based on the census of graduate course offerings at Texas A&M University and has been shown to be a valid and reliable model for collecting data on knowledge (Lindner, Dooley, Murphy, 2001). The skill and ability competencies were derived from the United States Department of Labor's Occupational Information Network (O*Net, 2000). Jackson and Schuler (2000) noted O*Net provides a national benchmark that offers a common language for all users of competency information. The skill category is based on Mumford and Peterson's (1995) taxonomy of skills and has been shown to be a valid and reliable model for collecting data on skills.

The ability category is based on Fleishman's ability requirements taxonomy and its associated measurement system and has been shown to be a valid and reliable method for collecting data on ability factors (Fleishman, Wetrogan, Uhlman, & Marshal-Mies, 1995). Fleishman's ability requirements taxonomy includes cognitive, psychomotor, physical, and sensory ability. Other institutions of higher education offering graduate degrees can use the Department of Labor skills and abilities as a standard measurement to benchmark competencies. Using a standard inventory of graduate courses to measure knowledge would be specific to each institution and content area.

As noted previously, various competencies needed by agricultural education graduates to be professionally successful in a given field have been identified in the literature. Further, doctoral students rely on a unique bundle of knowledge, skills, and abilities to be successful in the classroom and life. Little research, however, has focused on the compilation of unique competencies possessed by agricultural education doctoral students and which competencies are related to successful completion of a doctoral program of study. Lack of such information may subsequently inhibit opportunity for doctoral student growth as they progress in their education.

Purpose

The purpose of this study was to describe and explore perceived knowledge, skills, and abilities of current and past Texas A&M University Agricultural Education doctoral students as they progressed towards a doctoral degree. This study further attempts to develop a taxonomy from which to consider student competency assessment in agricultural education.

The specific objectives of the study were:

1. To describe and explore perceived knowledge competencies and examine the relationship between knowledge and progress towards degree.
2. To describe and explore perceived skill competencies and examine the relationship between skill and progress towards degree.
3. To describe and explore perceived ability competencies and examine the relationship between ability and progress towards degree.

Methods

The research design used for this study was descriptive and exploratory in nature. The target population was Texas A&M University's Department of Agricultural Education doctoral students and recent doctoral graduates. There were 68 doctoral students and recent graduates in the population. The population consisted of "beginning" students ($\underline{n}$=18) who had completed an application for admission and were within their first semester of course work; "middle" students ($\underline{n}$=32) who were actively and continuously enrolled, had a degree plan on file, satisfactorily completed the general exam, or had a research proposal approved; and "end" students ($\underline{n}$=18) who had completed and defended their dissertation or graduated within the past three years. In this paper, success is defined as attainment of a doctoral degree.

A census of the defined population was conducted. The questionnaire was designed to measure participants' perceptions on behavioral dimensions used to assess knowledge, skills, and abilities. The participants were asked to indicate their current level of competence in each dimension using a five-point Likert-type scale. The points on the scale are: 1 = Very Low; 2 = Low; 3 = Average; 4 = High; and 5 = Very High.

A limitation of this study is that competencies are self-reported perceptions and not a test measurement of the variables themselves. Although research suggests little differences between self-reported ratings, expert rating, and test measurements of competencies, larger samples of ratings and use of additional rating methods can lead to higher data reliability (Peterson, Mumford, Levin, Green, & Waksberg, 1997; Peterson, Owens-Kuntz, Hoffman, Arabian, & Whetzel, 1990; Fleishman, & Mumford, 1988.)

Data for this study were collected using a mixed mailed/Internet questionnaire. Dillman's (2000) general procedures for mailed/Internet questionnaires were followed. A response rate of 85% (N=58) was obtained for the study. Ninety-four percent of beginning students, 94% of middle students, and 75% of end students participated in the study. To control for non-response error, late respondents were compared to early respondents on the scaled items. No significant differences were found; therefore, the results of the study are generalizable to the target population (Miller, & Smith, 1983).

The instrument was pilot tested with 17 master's level graduate students at Texas A&M. Instrument reliability was estimated by calculating a Cronbach's alpha coefficient. Reliability for the scales on knowledge (.93), skills (.95), and abilities (.92) were calculated. Reliability estimates for corresponding sub categories are presented in Tables 1, 2, and 3. A panel of twelve experts at Texas A&M University and Texas Tech University established instrument content and face validity. The alpha level for statistical significance was set a priori at .05.

Findings

This section presents a summary of findings by objective.

Objective 1

The first objective of this study was to describe doctoral students by their perceived knowledge competencies and to examine the relationship between knowledge and progress towards degree. Participants were asked what level of knowledge they possessed on 22 items. Knowledge items were classified into four sub categories. Mean scores of sub categories were computed. Teaching Strategies Knowledge was defined as theories, techniques, and processes that enhance the teacher-learner process for adults and youth. Foundations Knowledge was defined as methods, theories, principles, and practices that provide a foundation for and guide the field of agricultural education. Applications Knowledge was defined as current trends, practices, and applications that facilitate change and technology transfer. International Knowledge was defined as theories, principles, and practices related to agricultural development in cross-national settings.

Table 1 shows participants' levels of Overall Knowledge ($\underline{M}$=3.13), Teaching Strategies Knowledge ($\underline{M}$=3.29), Foundations Knowledge ($\underline{M}$=3.21), Applications Knowledge ($\underline{M}$=3.16), and International Knowledge ($\underline{M}$=2.41). When subjected to an F-Test, Overall, $\underline{F}(2,56)=10.68$, Foundations, $\underline{F}(2,56)=13.13$, Applications, $\underline{F}(2,56)=11.21$, and International knowledge, $\underline{F}(2,56)=3.59$ were significantly related to progress towards degree. As doctoral students progressed towards a degree, their Overall, Foundations, Applications, and International knowledge increased. Teaching Strategies Knowledge, however, was not significantly related to progress towards degree, $\underline{F}(2,56)=2.68$.

Objective 2

The second objective of this study was to describe doctoral students by their perceived skill competencies and to examine the relationship between skill and progress towards degree. Participants were asked what level of skill they possessed on 43 items. Skill items were classified into seven sub categories. Mean scores of sub categories were computed. Content Skills, such as reading comprehension and mathematics provide a foundation for the acquisition of more specific skills. Process Skills, such as critical thinking and active learning contribute to increased acquisition of additional competencies. Social Skills, such as persuasion and social perceptiveness are developed capacities that help individuals achieve objectives. Complex Problem-Solving Skills, such as information gathering and idea evaluation are necessary to solve real-world problems. Technical Skills, such as technology design and operations analysis are needed to use information technologies effectively. Systems Skills, such as visioning and decision-making are needed to for people to work with others. Resource Management Skills such, as time management are needed to effectively and efficiently allocate resources.
Table 2 shows participants' levels of Overall Skill ($\underline{M}$=3.71), Social Skills ($\underline{M}$=4.00), Content Skills ($\underline{M}$=3.93), Process Skills (M=3.91), Complex Problem-Solving Skills ($\underline{M}$=3.89), Systems Skills ($\underline{M}$=3.65), Resource Management Skills ($\underline{M}$=3.64), and Technical Skills (3.17). When subjected to an F-Test, Overall, $\underline{F}(2,56)=11.38$, Social, $\underline{F}(2,56)=3.26$, Content, $\underline{F}(2,56)=6.98$, Process, $\underline{F}(2,56)=13.35$, Complex Problem-Solving, $\underline{F}(2,56)=11.47$, $\underline{F}(2,56)$=Systems, $\underline{F}(2,56)=8.33$, and Resource Management skills, $\underline{F}(2,56)=7.77$ were significantly related to progress towards degree. As doctoral students progressed towards a degree, their Overall, Social, Content, Process, Complex Problem-Solving, Systems, and Resource Management skills increased. The category of "Technical Skills", however, was not significantly related to progress towards degree, $\underline{F}(2,56)=3.01$.

Objective 3

The third objective of this study was to describe doctoral students by their perceived ability competencies and to examine the relationship between ability and progress towards degree. Participants were asked what level of ability they possessed on 23 items. Ability items were classified into seven sub categories. Mean scores for sub categories were computed. Verbal Abilities, such as oral comprehension and written expression are needed to communicate effectively. Idea Generation and Reasoning Abilities, such as inductive and deductive reasoning, are needed to formulate logical conclusions. Spatial Abilities, such as visualization are needed to understand components of a system. Auditory and Speech Abilities, such as speech clarity and auditory attention are needed to focus attention and deliver information. Attentiveness Abilities, such as time-sharing, are needed to handle multiple tasks or concentrate on single tasks. Quantitative Abilities, such as number facility and arithmetic reasoning, are needed to use mathematical methods to solve problems. Perception Abilities, such as speed and flexibility of closure, are needed to identify and make sense of complexly related material.

Table 1

Doctoral Student Perceived Level of Knowledge by Progress Towards Degree

Progress Towards Degree	Alpha[a]	N	M[b]	SD	F
Overall Knowledge	**0.93**	**58**	**3.13**	**0.68**	
Beginning		17	2.64	0.55	10.68*
Middle		24	3.15	0.57	
End		17	3.57	0.64	
Teaching Strategies Knowledge	**0.84**	**58**	**3.29**	**0.79**	
Beginning		17	2.98	0.85	2.68
Middle		24	3.29	0.68	
End		17	3.59	0.80	
Foundations Knowledge	**0.83**	**58**	**3.21**	**0.71**	
Beginning		17	2.67	0.60	13.13*
Middle		24	3.23	0.57	
End		17	3.72	0.64	
Applications Knowledge	**0.84**	**58**	**3.16**	**0.75**	
Beginning		17	2.61	0.49	11.21*
Middle		24	3.21	0.68	
End		17	3.65	0.75	
International Knowledge	**0.91**	**58**	**2.41**	**1.11**	
Beginning		17	1.98	0.83	3.59*
Middle		24	2.58	1.17	
End		17	2.94	1.10	

[a]Overall and subscale reliability was estimated by calculating a Cronbach's alpha coefficient;
[b]1=very low, 2=low, 3=average, 4=high, 5=very high; *p<.05

Table 3 shows participants' levels of Overall Ability (M=3.77), Verbal Abilities (M=4.13), Idea Generation and Reasoning Abilities (M=3.87), Spatial Abilities (M=3.79), Auditory and Speech Abilities (M=3.77), Attentiveness Abilities (M=3.70), Quantitative Abilities (M=3.48), and Perception Abilities (M=3.40). When subjected to an F-Test, Overall, $F(2,56)=10.53$), Verbal, $F(2,56)=9.25$, Idea Generation and Reasoning, $F(2,56)=13.14$, Auditory and Speech, $F(2,56)=13.03$, Attentiveness, $F(2,56)=3.39$, and Perception abilities were significantly related to progress towards degree. As doctoral students progressed towards a degree, their Overall, Verbal, Idea Generation and Reasoning, Auditory and Speech, Attentiveness, and Perception abilities increased. Spatial Abilities, F(2,56)=2.59, and Quantitative Abilities F(256)=.44, were not significantly related to progress towards degree.

Table 2

Doctoral Student Perceived Level of Skill by Progress Towards Degree

Progress Towards Degree	Alpha[a]	N	M[b]	SD	F
Overall Skill	**0.95**	**58**	**3.71**	**0.48**	
Beginning		17	3.37	0.39	11.38*
Middle		24	3.71	0.30	
End		17	4.04	0.54	
Social Skills	**0.75**	**58**	**4.00**	**0.49**	
Beginning		17	3.81	0.44	3.26*
Middle		24	3.98	0.41	
End		17	4.23	0.57	
Content Skills	**0.73**	**58**	**3.93**	**0.56**	
Beginning		17	3.58	0.48	6.98*
Middle		24	3.97	0.47	
End		17	4.22	0.57	
Process Skills	**0.81**	**58**	**3.91**	**0.62**	
Beginning		17	3.40	0.44	13.35*
Middle		24	4.00	0.52	
End		17	4.30	0.58	
Complex Problem-Solving Skills	**0.90**	**58**	**3.89**	**0.60**	
Beginning		17	3.43	0.48	11.47*
Middle		24	3.95	0.52	
End		17	4.27	0.56	
Systems Skills	**0.84**	**58**	**3.65**	**0.57**	
Beginning		17	3.33	0.48	8.33*
Middle		24	3.60	0.43	
End		17	4.04	0.63	
Resource Management Skills	**0.56**	**58**	**3.64**	**0.55**	
Beginning		17	3.29	0.45	7.77*
Middle		24	3.67	0.43	
End		17	3.96	0.59	
Technical Skills	**0.92**	**58**	**3.17**	**0.77**	
Beginning		17	2.92	0.83	3.01
Middle		24	3.10	0.51	
End		17	3.52	0.92	

[a]Overall and subscale reliability was estimated by calculating a Cronbach's alpha coefficient;
[b]1=very low, 2=low, 3=average, 4=high, 5=very high; *p<.05

Table 3

Doctoral Student Perceived Level of Ability by Progress Towards Degree

Progress Towards Degree	Alpha[a]	N	M[b]	SD	F
Overall Ability	**0.92**	**58**	**3.77**	**0.52**	
Beginning		17	3.45	0.35	10.53*
Middle		24	3.73	0.51	
End		17	4.15	0.45	
Verbal Abilities	**0.83**	**58**	**4.13**	**0.71**	
Beginning		17	3.65	0.72	9.25*
Middle		24	4.17	0.64	
End		17	4.57	0.48	
Idea Generation and Reasoning Abilities	**0.83**	**58**	**3.87**	**0.55**	
Beginning		17	3.50	0.38	13.14*
Middle		24	3.83	0.51	
End		17	4.31	0.47	
Spatial Abilities	**0.62**	**58**	**3.79**	**0.73**	
Beginning		17	3.62	0.67	2.59
Middle		24	3.69	0.66	
End		17	4.12	0.80	
Auditory and Speech Abilities	**0.54**	**58**	**3.77**	**0.62**	
Beginning		17	3.39	0.54	13.03*
Middle		24	3.68	0.52	
End		17	4.27	0.47	
Attentiveness Abilities	**0.40**	**58**	**3.70**	**0.58**	3.39*
Beginning		17	3.49	0.39	
Middle		24	3.65	0.66	
End		17	3.98	0.56	
Quantitative Abilities	**0.84**	**58**	**3.48**	**0.97**	
Beginning		17	3.29	0.87	0.44
Middle		24	3.56	0.85	
End		17	3.56	1.24	
Perception Abilities	**0.84**	**58**	**3.40**	**0.78**	
Beginning		17	3.10	0.59	4.41*
Middle		24	3.32	0.90	
End		17	3.82	0.59	

[a]Overall and subscale reliability was estimated by calculating a Cronbach's alpha coefficient;
[b]1=very low, 2=low, 3=average, 4=high, 5=very high; *p<.05

Conclusions and Implications

Based on the study objectives, the following conclusions were drawn and implications given.

The results presented here address the need, as described by Garton, et al. (1999) and Newcomb (1974), for information about what competencies are related to student success. As doctoral students progressed towards a degree, they acquired and strengthened unique bundles of competencies. Doctoral students showed growth in Overall Knowledge in general and Foundations Knowledge, Applications Knowledge, and International Knowledge in particular. Participants showed the most growth in International Knowledge, a category in which students had the lowest levels of competence.

Of the four knowledge categories used in this study, doctoral students had highest levels of competency in Teaching Strategies. Students, however, did not show growth in the acquisition and development in theories, techniques, and processes that enhance the teacher-learner process for adults and youth as they progressed towards a degree.

These findings, unlike those of Goecker (1992), showed that these particular doctoral students entered a degree program with well-developed teaching and learning competencies. Findlay's (1992) findings would suggest that such competencies would have been acquired through previous degree programs, experiences, and self-directed study.

More research, however, is needed to explore these relationships and whether perceived levels of knowledge meet minimally acceptable standards for doctoral students. For example, doctoral students must ultimately become experts in theory and design of research (Foundations Knowledge). Lower levels of knowledge related to the theory of research may result in frustration, demotivation, impeded learning, and ultimately failure for students. Faculty may similarly become frustrated in the development and delivery of course material if they are challenged by students who do not possess the requisite knowledge to master course material; or faculty may be able to use this information to improve curricula, teaching materials, and instructional delivery methods.

Because students perceived that they had the lowest level of competence in International Knowledge, even though this was the area in which they showed the greatest growth, an implication exists that low levels of knowledge related to theory of agricultural development in cross-national settings may cause negative consequences for students engaged in international agricultural development.

Doctoral students showed growth in Overall Skill in general and in Social Skills, Content Skills, Process Skills, Complex Problem-Solving Skills, Systems Skills, and Resource Management Skills. Participants showed the most growth in Process Skills and Complex Problem-Solving Skills. Of the seven skill categories used in this study, doctoral students had lowest levels of competency in Technical Skills. Further, students did not show growth in the acquisition and development in technology design and operations analysis needed to use information technologies effectively as they progressed towards a degree. As departments of agricultural education strive to meet the growing demand for distance education, an implication exists that doctoral graduates will need high levels of Technical Skills as it relates to technology design and operations analysis.

For those doctoral students entering Extension as a profession, these results suggest that doctoral students acquire the necessary resource management skills to be effective employees (Place, & Jacob, 2001). These results, like those of Dyer and Osborne (1996), showed that students could acquire and develop problem-solving skills.

Minimally acceptable skill standards for success in a doctoral program are not known and the problems and opportunities listed above also apply here. For example, will international students, who have been shown to have lower levels of social skills than domestic students (Timko, Linhardt, & Steward, 1991), be disadvantaged in completing a doctoral program? Or, will international students rely on different competences to perform an observable behavior in order to be successful? If higher levels of social skills are necessary to complete a doctoral program, then international students are at a distinct disadvantage for completion. More research is needed to explore these relationships.

Doctoral students showed growth in Overall Abilities in general and in Verbal Abilities, Idea Generation and Reasoning Abilities, Auditory and Speech Abilities, Attentiveness Abilities, and Perception Abilities. Participants showed the most growth in oral comprehension and written expression needed to communicate effectively. Doctoral Students did not show growth in the acquisition and development of visualization needed to understand components of a system (Spatial Abilities) and number facility and arithmetic reasoning needed to use mathematical methods to solve problems (Quantitative Abilities) as they progressed towards a degree. Again, the problems and opportunities discussed in the first two conclusions apply here and little is known about acceptable ability standards for success in a doctoral program.

For example, students need well-developed abilities, such as perceptual abilities, to think critically at higher levels of cognition (McCormick, & Whittington, 2000). Participants in this study showed growth in perceptual abilities and they progressed towards a degree. Perceptual Abilities, however, was the lowest rated ability category. Whether students with higher Perceptual Abilities are more likely to be successful in a doctoral program is not known. More research is needed to explore these relationships.

As noted earlier, a limitation of self-administered rating scales, such as the one used for this study, is that they measure perceptions of the person making the judgment. Additional research is needed to verify the validity of such judgments. Further, replication of this study with other student populations is needed to evaluate the extent to which the results presented here would be similar and recommendations applicable. One procedure for gathering these data would be to conduct authentic assessments of student competencies through testing, faculty assessment, peer assessment, or other forms of external assessment. This procedure would result in larger samples of ratings, which may lead to higher reliability.

Longitudinal research is needed to verify these results as new students join the program, and as beginning and middle of program students achieve or fail to achieve success. Doctoral students can use these results to help identify and understand their unique bundle of knowledge, skill, and abilities that will help them achieve success, and can use these results to develop opportunities for competency acquisition and growth (Drawbaugh, 1972). Faculty members use these results now in limited and expanded capacities to take advantage of a student's unique bundle of knowledge, skill, and abilities. Faculty can create individual learning plans for students by authenticating these results. We have used this approach to help students use strengths on certain competencies to overcome weaknesses in others. Authentication of these results by faculty can also provide direction in development, refinement of courses, and curricula.

The findings of this study contribute to the growing body of literature related to the compilation of knowledge, skills, and abilities that influence student success. Research findings, like those presented here, should be scrutinized against strategic objectives to insure that departments of agricultural education are fulfilling their missions. For example, "Teaching is the raison d'être" of the Department of Agricultural Education at Texas A&M University (Shinn, 2001, p. 4). Doctoral students' perceptions of their level of theories, techniques, and processes that enhance the teacher-learner process for adults and youth should be compared against a department's strategic objectives with respect to Teaching Strategies Knowledge to insure that desired levels are acquired. Findings show doctoral students have higher levels of Teaching Strategies Knowledge than any other knowledge category. Competencies that do not show growth, such as Technical Skills, should be evaluated against a department's strategic objective to insure that desired student growth is occurring. This study provides a model for benchmarking competencies and provides baseline data for making such changes. Further, the methods and procedures used in this study provide a taxonomy from which to consider student competency assessment in agricultural education.

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An Assessment Of Student Agricultural Literacy Knowledge Based On The Food And Fiber Systems Literacy Framework

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Abstract

Over 11 years ago, agricultural literacy was nationally recognized as a need for every K – 12 student (NRC, 1988), but in an already overloaded curriculum an appropriate and un-intrusive method of incorporation was needed. The Food and Fiber Systems Literacy (FFSL) Framework was designed to make connections to agricultural concepts through existing curricula. The purpose of this quasi-experimental study was to assess change in student knowledge after infusing the FFSL Framework in core academic subjects (Igo, Leising, and Frick, 1999; see also Igo & Leising, 1999). The treatment group was composed of 2 kindergarten-through-twelfth-grade schools in Montana and Oklahoma. A school in Nebraska was used as the control. Pretest and posttest mean score comparisons by grade groupings and the 5 thematic areas in the FFSL Framework resulted in significant knowledge gains in 3 of the grade groupings for the treatment group. No significant gains came from the control group. Three thematic areas yielded the most statistically significant knowledge gains in the treatment group: Understanding Agriculture; History, Culture, and Geography; and Science and Environment. The study concluded that the FFSL Framework can be used effectively to infuse instruction about agriculture in the schools studied.

Introduction

Urbanization and the ever-increasing roles of technology in people's lives continue to distance people from their agricultural roots. With nearly 20% of the labor force in America working in agricultural related industries (Petrulis, Green, Hines, Nolan and Sommer, 1987), the need for literacy about agriculture is greater than it has ever been.

In 1988, the National Research Council's Committee on Agricultural Education in Secondary Schools proposed that an agriculturally literate person would understand the food and fiber system in relation to its history, economic, social, and environmental significance (National Research Council, [NRC] 1988). The committee also recommended "all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (NRC, 1988, p.10).

Frick, in 1990, reported one of the first conclusive agricultural literacy definitions: "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system... An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p.52).

Much of the agricultural literacy research has been focused on instructional material assessment. In evaluating the Georgia Agriculture in the Classroom program, Herren and

Oakley (1995) concluded the materials were effective with both urban and rural students. Swortzel (1996) reported an Ohio study assessing fourth-graders knowledge of animal agriculture. A pretest/posttest design was used and a statistically significant difference was shown between the two test scores with greater gains for students living in urban areas. Trexlar (1997) concluded the introduction of an agriculturally based science curriculum "did not alter or negatively effect student perceptions of science, agriculture, or their agri-science knowledge level" (p.19).

Nunnery (1996) noted the necessity for building a literacy framework for understanding agriculture's perspectives and viewpoints. Leising and Zilbert (1994) approached agricultural literacy from this angle. They developed a systematic curriculum framework identifying what students should know or be able to do. The Food and Fiber Systems Literacy Framework explained what an agriculturally literate high school graduate should comprehend. Using a series of standards in five thematic areas, the framework delineated the necessary components for understanding the way food and fiber systems relate to daily life (see Figure 1 for a listing of standards and themes). Breaking the standards into grade-grouped benchmarks, K-1, 2-3, 4-5, 6-8, the framework provided a systematic means of addressing agricultural literacy (see Figure 2 for examples of benchmarks).

One point of contention was the most appropriate and least intrusive way to incorporate instruction into an already overloaded curriculum (Law, 1990). The Food and Fiber Systems Literacy Framework (FFSL) was designed to make connections to agricultural concepts through existing curriculum. Through case studies, Igo, Leising and Frick found that education about agriculture could be infused into core academic learning. They reported that students already had some knowledge about agriculture, but that by infusing instruction on food and fiber into the academic core curriculum knowledge about agriculture increased significantly (Igo, Leising, and Frick, 1999; see also Igo & Leising, 1999).

Experimental or quasi-experimental research designs were not used in previous studies to control for specific variables. Therefore, in the second year of the Food and Fiber Project evaluation a quasi-experimental research design was employed.

Purpose and Objectives

The purpose of this study was to assess food and fiber systems knowledge of selected students in kindergarten through eighth grade before and after receiving instruction based upon the Food and Fiber Systems Literacy Framework Standards and Benchmarks. For the treated and control groups of this research, the specific objectives included:

1. Compare differences by grade grouping (K-1, 2-3, 4-5, 6-8) for the treatment group and control group in student knowledge about agriculture before and after instruction based upon the FFSL Framework.

2. Compare differences by grade grouping for the treatment group and control group in student knowledge about agriculture before and after instruction based upon the five thematic areas of the FFSL Framework.

3. Determine if a relationship existed between the differences in student knowledge about agriculture before and after instruction based upon the FFSL Framework and the number of teacher-reported instructional connections to the Framework.

Methods and Procedures

This study is a variation of the quasi-experimental nonequivalent control group design described by Campbell and Stanley (1963). The treatment group was composed of 21 classrooms in kindergarten through eighth grade from one school in Oklahoma and one school in Montana. A total of eight classes in Montana and 13 classes in Oklahoma composed the treatment group. Both schools were part of the Food and Fiber Systems Literacy Project. These school sites were chosen based on geographic diversity, school size and teacher willingness to infuse food and fiber systems literacy in kindergarten through eighth grade.

The control group was a school in Nebraska. The school was chosen because it was a rural school with social/economic characteristics and size similar to the treatment schools. Also, the school was willing to involve kindergarten-through-eighth-grade students and teachers in the study. A total of seven classes composed the control group.

Instrumentation

To control for existing knowledge of food and fiber systems and to determine similarity, students in the treatment and control groups were administered the same pretest at the beginning of the school year and the same posttest at the end of the academic year. These instruments were developed by the researchers for measuring food and fiber systems knowledge for each grade grouping in the Food and Fiber Systems Literacy Framework; K-1, 2-3, 4-5 and 6-8 (see Figure 1 for a description of the standards and themes). Questions on each instrument were based on the grade-grouped benchmarks (see Figure 2 for examples of benchmarks). The K-1 and 2-3 instruments included 16 and 21 items respectively. Both primarily used a format consisting of questions to be read by the teacher followed by a series of illustrations from which the students were to select the correct answer or answers. The K-1 instrument responses were entirely pictures, while the 2-3 instrument used picture and simple text responses. The 4-5 and 6-8 grade level instruments contained 35 and 30 text-responses respectively. The instruments had been used by the researchers in earlier studies and had reliability coefficients ranging from 0.7763 to 0.9469. These instruments were developed utilizing a panel of experts and were pilot tested with students at the various development levels included in this study.

Treatment

The treatment group consisted of two schools, each with students enrolled in grades K-8 that were part of the Food and Fiber Systems Literacy Project. Teachers from these schools were prepared to infuse the Food and Fiber Systems Literacy Standards and Benchmarks into core academic subjects by participating in the 1997-1998 two-phase training. Phase I training at each site involved an overview of the Project, followed by orientation to the Framework, Standards and Benchmarks and the introduction of the supporting lessons and activities. In addition, Phase

Themes

	I. Understanding Food & Fiber Systems	II. History, Geography, and Culture	III. Science, Technology, and Environment	IV. Business & Economics	V. Food, Nutrition, & Health
Standards	A. Understand the meaning of Food & Fiber Systems/ agriculture.	A. Understand the Food & Fiber Systems' role in the evolution of civilizations.	A. Understand how ecosystems are related to Food & Fiber Systems.	A. Understand Food & Fiber Systems and economics are related.	A. Understand Food & Fiber Systems provide nourishment for people and animals.
	B. Understand the essential components of Food & Fiber Systems (e.g. production, processing, marketing, distribution, research and development, natural resource management, and regulation).	B. Understand the Food & Fiber Systems' role in societies throughout world history.	B. Understand Food & Fiber Systems' dependence on natural resources.	B. Understand Food & Fiber Systems have an impact on local, national, and international economies.	B. Understand Food & Fiber Systems provide healthy diet components.
	C. Understand Food and Fiber Systems' relationship to society.	C. Understand the Food & Fiber Systems' role in U.S. history.	C. Understand management and conservation practices used in Food & Fiber Systems.	C. Understand government's role in Food & Fiber Systems.	C. Understand Food & Fiber Systems provide food choices.
	D. Understand the local, national, and international importance of Food and Fiber Systems.	D. Understand the relationship between Food and Fiber Systems and world cultures.	D. Understand science and technology's role in Food & Fiber Systems.	D. Understand factors influencing international trade of food and fiber products.	D. Understand Food & Fiber Systems promote a safe food supply.
	E. Understand Food and Fiber Systems careers.	E. Understand how different viewpoints impact Food and Fiber Systems.			

Figure 1. Standards for each of the five themes in the Food & Fiber Systems Literacy Curriculum Framework.

Standard (Example)	Benchmarks
D. Understand science and technology's role in Food and Fiber Systems.	
Students will identify tools and machines used in Food and Fiber Systems. They will give examples of tools and machines used to produce food and fiber products.	K-1
Students will recognize inventors and their inventions related to Food and Fiber Systems. They will describe the agricultural importance of the inventions.	2-3
Students will explain how technological advancements enhance Food and Fiber Systems' efficiency. They will list technologies that reduce manual labor needs in agriculture.	4-5
Students will identify Food and Fiber Systems careers dependent on science and technology skills. They will contrast these skills needed for agricultural and non-agricultural careers.	6-8
Students will recognize how science and technology impact Food and Fiber Systems. They will analyze the effects of science and technology on food, clothing, shelter, and career choices.	9-12

Figure 2. Example of benchmarks for a single standard in the Food and Fiber Systems Literacy Curriculum Framework.

I involved teachers in hands-on activities. Phase II training included time for teachers to become familiar with the Project web site, including instruction on submitting electronic reports to the Project staff. The majority of Phase II was spent in helping teachers plan instructional time throughout the academic year to address food and fiber systems concepts. In 1998-1999, the teachers received an update of the project and time was spent with each teacher in planning and encouraging them to address the appropriate standards and benchmarks in their instruction.

Data Collection

The pretest was given to the treatment group and control group during September, 1998 prior to any Food and Fiber Systems instruction. Teachers administered the pretests in their classrooms. The instruments were collected by building principals and returned to the researcher by mail.

Infusion of Food and Fiber Systems Literacy Standards and Benchmarks for the treatment group took place during the 1998-1999 academic year (September through April). The posttest was administered to the treatment and control groups during early May, 1999. Teachers administered the instrument in their classrooms. The principal collected the completed instruments and forwarded them to the researchers.

Teachers in the treatment group provided feedback regarding the connections made to the Framework throughout the project year. They indicated the theme, standards and benchmarks addressed. Teachers submitted feedback electronically or through the mail to the researchers.

Analysis of Data

After administration, the completed tests were scored and coded into a Microsoft™ Excel spreadsheet for analysis. Means and percentages were computed by grade-level grouping for the test scores from both groups. Analysis of variance procedures were performed using SAS version 6.11 to determine differences in pretest and posttest knowledge scores. Data analysis procedures were followed for unequal sample size. Classrooms were used as the unit of analysis and results reported by grade grouping (K-1, 2-3, 4-5, 6-8). The analyses included the General Linear Model's procedure and computation of Least Squares Means to delineate differences by theme area of the Food and Fiber Systems Literacy Framework. A Pearson's Product Moment Correlation was computed to assess relationships between pre- and posttest differences and the number of teacher reported instructional connections to the framework.

Results/Findings

Pretest and Posttest Grade Grouping Analysis

The pretest and posttest food and fiber knowledge levels for the treatment group and the control group are reported in Table 1. The mean test scores recorded for each grade grouping in the table indicated statistically significant differences between pretest and posttest knowledge scores, as determined by Analysis of Variance. The mean score for grade grouping 2-3 of the treated group increased by over 15 points, yielding statistical significance at the 0.05 level. The treatment group in grade groupings 4-5 and 6-8 also yielded 0.05 level significance for the differences between the pretest and posttest scores. Only the K-1grade grouping failed to show significance. The control group failed to show significant differences between the mean scores of the pretest and posttest for any of the four grade groupings.

It must be noted that the control group obtained higher mean scores in the pretest for every grade grouping than did the treatment group. In two grade groupings, K-1 and 2-3, the control group also scored higher than the treatment group for the posttest. It must also be noted, however, that in spite of having higher agricultural knowledge pretest mean scores than the treatment group, the control group failed to obtain significant increases in its posttest food and fiber knowledge scores, while the treatment group showed significant differences between the pretest and posttest mean scores in three of the four grade groupings.

Table 1.

F-Value Comparison of Food and Fiber Knowledge Pretest and Posttest Differences for the Treatment Group and Control Group

	Treatment				Control			
Grade	Pretest Mean	Posttest Mean	F-value	p	Pretest Mean	Posttest Mean	F-value	p
K-1	41.89	51.10	4.73	0.0606	43.38	47.43	0.45	0.5197
2-3	78.72	94.13	17.28	0.0014*	84.82	98.06	4.33	0.0611
4-5	24.36	28.21	17.51	0.0032*	25.17	26.16	0.50	0.4946
6-8	22.42	28.31	15.57	0.0064*	23.88	26.0	0.36	0.5567

*$p<0.05$

Thematic Area Analysis

The Food and Fiber Systems Literacy Framework was organized around five thematic areas: Understanding Agriculture; History, Culture, and Geography; Science and Environment; Business and Economics; and Food, Nutrition and Health. Table 2 provides the F-value comparison of the pretest and posttest score differences by grade groupings within theme areas for the treatment group and control group. Three thematic areas yielded the most statistically significant differences in the treatment group: Understanding Agriculture; History, Culture, and Geography; and Science and Environment. In each of the three thematic areas, statistical significance appeared within the 2-3, 4-5, and the 6-8 grade groupings. The treatment group also registered statistically significant differences for two grade groupings in the Business and Economics theme (2-3 and 4-5); and for two grade groupings in the Food, Nutrition, and Health theme (K-1 and 2-3).

Table 2.

F-Value Comparison of Composite Pretest and Posttest Differences Within Theme Areas For Treatment and Control Groups

	Treatment		Control	
Themes and Grade Groupings	F-value	p	F-value	p
Understanding Agriculture				
K-1	2.46	0.1546	0.01	0.9204
2-3	5.68	0.0354*	0.15	0.7076
4-5	13.12	0.0108*	0.61	0.4547
6-8	18.10	0.0082*	0.01	0.9346
History, Culture, and Geography				
K-1	2.79	0.1328	0.22	0.6482
2-3	13.54	0.0033*	2.36	0.1535
4-5	12.29	0.0068*	0.28	0.6088
6-8	10.09	0.0186*	0.86	0.3653
Science and Environment				
K-1	1.38	0.2723	0.17	0.6898
2-3	10.09	0.0083*	8.19	0.0155*
4-5	6.02	0.0147*	0.81	0.3675
6-8	34.52	0.0183*	0.18	0.6729
Business and Economics				
K-1	0.59	0.4675	0.88	0.3750
2-3	24.75	0.0003*	16.35	0.0020*
4-5	5.28	0.0468*	0.05	0.8216
6-8	0.62	0.4583	0.24	0.6323
Food, Nutrition, and Health				
K-1	19.71	0.0020*	7.41	0.0232*
2-3	16.25	0.0018*	0.10	0.7567
4-5	0.72	0.3954	0.36	0.5512
6-8	5.78	0.0734	0.02	0.8808

*$p<0.05$

The control group showed no statistical differences between the pretest and posttest scores for any of the grade groupings in the first two thematic groups: Understanding Agriculture; and History, Culture, and Geography. The control group did, however, show a statistical difference in a single grade grouping for each of the last three thematic areas: Science and Environment (grade group 2-3); Business and Economics (grade group 2-3); and Food, Nutrition, and Health (grade group K-1).

Relationship Between Student Knowledge and Teacher Connections

Pearson's Product Moment Correlation Coefficient was computed using SAS to assess whether a relationship existed between the difference in pretest and posttest knowledge scores and the number of instructional connections that teachers made to food and fiber systems. Those instructional connections were based upon feedback provided by the teachers within the treatment group as a part of the Food and Fiber Systems Literacy Project. Table 3 summarizes the result of the analysis. Unlike the previous year of this study, the sites in the treatment group failed to show a statistically significant correlation between the test score differences and the number of instructional connections made by teachers.

Table 3.

Correlation Of Differences in Pretest and Posttest Scores to Instructional Connections at the Treatment Site

Site	n	Reported Connections	Pearson r	p
Treatment Group	21	143.8	0.1637	0.3154

*$p<0.05$

Conclusions

The conclusions are based on the findings and were not to be generalized beyond the population of this study.

1. Students had some knowledge of food and fiber systems prior to the study. The Nebraska control group possessed more knowledge at the beginning of the study compared to the Oklahoma and Montana treatment group.

2. The Oklahoma/Montana treatment group increased student knowledge about agriculture by infusing instruction based upon the Food and Fiber Systems Literacy Framework Standards and Benchmarks.

3. Student knowledge increased most frequently within three themes: Understanding Agriculture; History, Culture and Geography; Science and Environment. This conclusion was also reached in the first year of the project.

4. No relationship existed between the number of connections teachers made to the Food and Fiber Systems Literacy Framework and increases in student knowledge. However, in the first year of this study, a significant relationship existed between student knowledge and the number of teacher connections to the Framework.

Recommendations

Based upon the conclusions and major findings of this research, the following recommendations were made:

1. Further research is needed to understand why no significant increase in pre- and posttest knowledge score differences in the K-1 grade grouping occurred for the themes, Understanding Agriculture; History, Culture and Geography; Science and Environment; and Business and Economics.

2. Additional research is needed to understand how teacher behavior in the classroom impacts acquisition of agricultural knowledge by students. Conflicting findings in this paper regarding the relationship between student knowledge and the number of teacher reported connections to the Food and Fiber Systems Literacy Framework provides a basis for further study.

3. Food and Fiber Systems Literacy Standards and Benchmarks and evaluation instruments should be made available to educators and practitioners. Through implementation, it will become clearer if this systematic approach to agricultural literacy will be workable in a majority of the school districts across the country.

4. There is a need to field-test the Food and Fiber Systems Literacy Standards and Benchmarks for grades 9-12 in whole-school settings. Field-testing will help to develop an understanding of how to implement food and fiber literacy across disciplines and through departments.

Implications

The Food and Fiber Systems Literacy Framework can be used effectively to guide instruction about agriculture in grades K-8. The opportunity exists for further dialogue about agricultural literacy and the use of standards and benchmarks to assess student progress. Discussions among agricultural literacy professionals, agriculture industry leaders, agriculture educators, curriculum specialists, and local and state education leaders must focus on reaching consensus about the definition and scope of agricultural literacy instruction. The Food and Fiber Systems Literacy Framework provides a model and starting point for discussion.

This study used the whole-school setting to implement food and fiber systems literacy instruction. The project learned that by involving an entire school a synergy among teachers, administrators, students and parents was created. This synergy may lead to greater overall student achievement and increase the sustainability of agricultural literacy in the school curriculum.

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Are We Preparing the Society Ready Graduate?

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Abstract

Educational reform measures have helped schools to form partnerships with business and industry to achieve common goals of a prepared workforce. These partnerships have forced colleges of agriculture to examine its mission and update the curriculum. This study sought to provide benchmark data on the skills and abilities important to employers and the level of preparation of recent agricultural and extension education graduates. Additional input was sought on the life experiences that were important for entry level positions and the areas that would impact graduates in the future. Overall, graduates were prepared for entry level positions; however, several areas were identified where skills could be improved to match the expectations of the employers. The skills of teamwork, decision-making, leadership, and initiative were identified needing the greatest improvement. The access and use of the Internet were the most important computer skills while presentation skills and verbalizing needed to improve in the communications skill area. Employers rated honesty, integrity, and dependability as very important desired abilities.

Introduction/Theoretical Framework

This concern of preparing students to work in a highly competitive global market is a major motivator for the fast forming partnerships between higher education and business and industry. Since the 1980s, school reform reports have called for changes that would ultimately transform the nature of education and business partnerships. Schools were faced with the need for educational reform measures that would better prepare a diverse student population for the higher order thinking and reasoning skills required in an increasingly knowledge-based, service-driven economy. Businesses were faced with the threat of an inadequately prepared work force that would jeopardize their competition with other industrialized nations. Motivated to improve the academic and technical skills of the future work force, businesses and schools joined in partnerships of various sizes and types to achieve their common and separate goals (Lankard, 1995). The partnerships between higher education and business and industries have huge implications for agriculture.

Providing the capacity to function effectively and responsibly in a global environment is at the core of the educational mission of land-grant universities and allied baccalaureate granting institutions offering programs in agriculture, natural resources, and human sciences (GASEPA, 2000). For more than a decade, employers have expressed a concern for the lack of graduates sufficiently trained to meet the challenges of a high-performance workplace. It has been proposed that the curricula of agriculture were out of date and should be changed (Krunkel, Maw, and Skaggs, 1996). As a result, many colleges of agriculture have undergone programmatic changes and reexamined the philosophy underlying their missions. The society ready graduate is a common phrase used in the new mission and vision statements of colleges.

In the report, Visions of Change in Higher Education, the W.K. Kellogg Foundation (1994) challenged land-grant universities to assess whether undergraduate teaching programs are still relevant to employers. If agricultural industries are to survive, the agriculture curriculum must be dynamic and able to adjust to new situations and environments that help to improve on-the-job effectiveness of future graduates (Coorts, 1987, Slocombe & Baugher, 1988). Thus, the framework for this study was based on the need to determine if the curriculum offered in agriculture was relevant for employer needs. Within the context of needs assessment, Gall, Borg, and Gall (1996) define a need as a discrepancy between an existing set of conditions and a desired set of conditions. In a model proposed by Rossett (1987) data collected from stakeholders helps to determine the desired conditions or "optimals." Thus, the difference in the desired status and actual status is the organizational need.

Studies in the last decade have found various needs desired by employers. Andelt, Barrett, and Bosshamer (1997) found that employers desired employees with leadership abilities, especially in the areas of problem solving and team work. This was consistent with the findings of Klein (1990) who found that the ability to be a team player was important for employees to possess. Other skills identified by Klein included the ability to listen and carry out instructions, read and understand specific technical information, use general business computer software, interpret and use math and statistical methods, have a positive work attitude, high ethical values, and be self motivated. Radhakrishna and Bruening (1994) found that employees and students value interpersonal, business, and communication skills. Communication skills and customer relations skills were also reported by Foster (1989). Long, Straquadine, and Campbell (1992) found that graduates value knowledge and skills in the computer sciences and oral and written communication. Marciel (1994) reported that employers look for communication skills, attendance, and appearance when hiring new employees. In addition, a number of researchers have advocated the need for practical work experience (Merritt and Hamm, 1994). Brown and Fritz (1993) found there was a grave need for better leadership preparation for today's students to succeed in the workplace. Other findings from Blezek and Dillon (1991) indicate that graduates need honesty, integrity and fairness, interest in learning, positive work ethics, willingness to work, reading comprehension, written communication, math and computation skills. According to Klein (1990), educating students for a career in agriculture and natural resources demands greater skills plus a more holistic perspective on its interaction with society.

Although higher education has been criticized regarding the absence of industry input in the decision making process (Long, Straquadine, and Campbell, 1992), this input is increasingly important due to the rapid technological advances. Such a partnership could be used to determine if changes are needed in the curriculum and extracurricular offerings. Dick and Carey (1996) point out that need assessment is the most important element in the instructional design process. The more that is known about competencies needed in agriculture careers and is incorporated into curriculum development, the more employable agriculture graduates will be in the marketplace. Additionally, the input from employers would provide a benchmark against which future students would be compared and serve as an assessment indicator.

Due to changes in college curricula, increased technical competencies, and changing industry, there is a need to determine if graduates are society ready? Do they possess the entry-level knowledge, skills and abilities required of college graduates? Have we adequately incorporated the desired skills into the college curriculum so that graduates are qualified to adapt to the high-tech, fast paced jobs of the future? Students enrolled in these programs also need reassurances that the skills and abilities they learn will be meaningful to their future employment goals.

Purpose and Objectives

The purpose of this study was to determine knowledge, skills, and abilities desired of employers of entry level graduates of the Department of Agricultural and Extension Education. The specific objectives were to:

1. Describe the level of preparation of knowledge, skills, and abilities needed for entry-level positions of agricultural and extension education graduates.

2. Describe the level of importance of knowledge, skills, and abilities of entry-level positions for agricultural and extension education graduates.

3. Determine if differences exist in the level of preparation and the importance of the knowledge, skills and abilities of agricultural and extension education graduates.

4. Describe the perceived value of experiential education in the curriculum of agricultural and extension education.

5. Describe the major trends which will be affecting the future preparation of agricultural and extension education graduates.

Methodology

The population of this study consisted of employers of entry-level graduates from the Department of Agricultural and Extension Education (AEED) from 1996 to 1999. This alumni list was obtained from the Department of Agricultural and Extension Education records. Duplications were removed leaving 37 different employers representing public schools, government agencies, banks, and agricultural businesses. A letter was sent to each employer in the study to explain the purpose of the study. Approximately two weeks after the pre-letter, the employer survey was mailed with an accompanying cover letter from the Dean of Agricultural, Food, and Life Sciences. A post card and second surveys were mailed to all late respondents. There were 20 employer surveys used in the study for a response rate of 54.1%. No differences were found in early and late respondents. According to Miller and Smith (1983), non respondents are assumed to be similar to late respondents.

<u>Instrument</u>

The survey instrument was a self-administered questionnaire adapted from other studies used at Land Grant Institutions. It was modified to include statements of skills and abilities identified in the literature important to employers. A committee composed of 10 representatives from various agricultural disciplines validated the content of the survey questions. It was field tested with local industry representatives.

The questionnaire had four parts. The first part of the questionnaire consisted of six questions designed to measure the preparation and importance of knowledge, skills, and abilities of entry level employees. The employer was asked to rate the preparation of the entry-level employee on interpersonal skills, communication skills, computer skills, character traits, and technical competency. The ratings were ranked in order for preparation from 1= unprepared to 5 = thoroughly prepared. For the same set of skills and abilities, the employer was asked to rate the importance of these same skills with 1= unimportant to 5 = extremely important.

Part two of the questionnaire related to the importance of certain life experiences for entry level employees. The life experiences included a career related internship, career related employments, general work experience, officer of a student club, an active student club member, ability to speak more than one language, and international experiences such as exchange trips. These life experiences were ranked in order from 1 = not important to 5 = extremely important.

Part three of the questionnaire was associated with the perceived growth areas in the next five to ten years that would influence this field of study. Each respondent was asked to rank the top strength or growth areas from 1 = little growth to 7 = significant growth. In addition, there were open-ended questions pertaining to the trends and issues which could impact educational training of the graduates.

For the analysis, the mean scores were calculated and responses to importance of life experiences and future trends were ranked.

Findings

Objective One

The first objective was to describe the level of preparation of AEED graduates on entry level knowledge, skills, and abilities. Employers were asked to rate entry level interpersonal skills, communication skills, computer skills, character skills and technical competencies of graduates.

Regarding interpersonal skills, the employers felt that the graduates of agricultural and extension education were best prepared in the area of initiative (Mean =3.72). Graduates were rated as prepared on all of the skills in the interpersonal areas with the mean ratings clustered around the midpoint signifying prepared for entry-level positions.

The means of decision-making, problem-solving, organizational skills, teamwork and etiquette had a mean score of 3.56. Having creativity (Mean=3.44) and global awareness (Mean=3.43) were the lowest rated interpersonal skills for which AEED students were prepared. No employer rated the AEED students are thoroughly prepared on any of the interpersonal or adaptive skills. The mean values are shown in Table 1.

Agricultural and Extension Education graduates were most prepared to understand instructions (Mean = 3.89) followed by listening (Mean=3.83) on communication skills. Being prepared to use the telephone effectively and verbalize their ideas had mean values of 3.59 and 3.56, respectively. The skills of AEED graduates which were rated lower in preparation included presentation skills (Mean=3.39) and creative writing (Mean=3.22). Students were rated as somewhat unprepared in being able to speak another language with a mean score of 2.00.

Employers also rated the preparation of the entry level computer skills. In general, employers rated AEED graduates as more prepared in word processing (Mean= 3.56) skills than other computer skills. AEED graduates were rated below average in all other computer skills. Using computer-aided design packages (Mean=3.21) was the skill that graduates have the least amount of preparation according to these employers.

Another component of entry-level preparation includes how well graduates exhibit a variety of character skills or traits. As shown in Table 1, AEED graduates were rated somewhat equally on the character areas of honesty, dependability, and integrity with honesty having the highest overall mean of 4.00.

Employers were also asked to rate the level of preparation of graduates in the technical areas of the curriculum. This included areas in the biological sciences, physical sciences, humanities/arts, social sciences, mathematics, and agricultural sciences. Employers felt that graduates had good preparation in the agricultural sciences (Mean=4.00) and were prepared in all other areas. The mean score for preparation in the biological sciences was 3.71 and 3.52 in the physical sciences. All mean values are shown in Table 1.

Objective 2.

The second objective was to describe the level of importance of the basic workplace knowledge, skills and abilities for entry level jobs. While it is important to know how prepared AEED graduates are to enter the work place, it is equally as important to know which skills are considered as the most important skills for the entry-level positions.

As show in Table 1, the skills of leadership, teamwork and dedication (Mean=4.56) were equally rated as very important interpersonal skills. Decision making and problem solving were also highly rated with mean values of 4.38 and 4.39, respectively. All but two of the interpersonal skills were rated as very important.

Listening (Mean= 4.50) was rated with the most important communication skill by the employers. Understanding instruction and verbalizing were also rated as very important communication skills (Mean =4.44) along with presentation skills (Mean =4.11).

Word processing (Mean= 3.72) and Internet skills (Mean =3.71) were the most important computer skills needed by graduates according to the employers in this study. All computer skills were rated as important for AEED graduates.

Table 1. Employer's Value of Preparation & Importance of Work Skills of AEED Graduates

Interpersonal Skills	Preparation		Interpersonal Skills	Importance	
	M	SD		M	SD
Initiative	3.72	1.13	Teamwork	4.56	0.61
Appearance	3.61	1.14	Leadership	4.56	1.13
Dedication	3.61	1.28	Dedication	4.56	1.28
Decision Making	3.56	0.70	Problem Solving	4.39	.0.50
Problem Solving	3.56	0.70	Initiative	4.39	0.50
Etiquette	3.56	0.85	Decision Making	4.38	0.69
Organizational Skills	3.56	0.86	Organizational Skills	4.28	0.46
Open-minded	3.56	0.98	Appearance	4.23	0.56
Teamwork	3.56	1.14	Open-minded	4.22	0.73
Leadership	3.50	1.04	Etiquette	4.11	0.69
Management Skills	3.47	1.06	Management Skills	4.00	0.76
Creativity	3.44	1.04	Creativity	3.89	0.67
Global Awareness	3.43	1.03	Global Awareness	3.56	0.86
Communication Skills	**Preparation**		**Communication Skills**	**Importance**	
	M	**SD**		**M**	**SD**
Instructions	3.89	0.83	Listening	4.50	1.29
Telephone	3.59	1.00	Instructions	4.44	0.51
Listening	3.83	1.61	Verbalizing	4.44	0.61
Verbalizing	3.56	0.92	Presentation Skills	4.11	0.76
Technical Writing	3.38	0.85	Technical Writing	3.67	0.90
Creative Writing	3.22	0.87	Telephone	3.58	1.00
Presentation Skills	3.39	0.84	Creative Writing	3.35	0.93
Second Language	2.00	0.91	Second Language	2.43	1.22
Computer Skills	**Preparation**		**Computer Skills**	**Importance**	
	M	**SD**		**M**	**SD**
Word Processing	3.56	0.70	Word Processing	3.72	0.46
Spreadsheets	3.31	0.60	Internet Use	3.71	0.61
Database Mgt	3.25	0.57	Spreadsheets	3.43	0.63
CAD	3.13	0.54	Database Mgt.	3.43	0.63
Graphics	3.25	0.58	Graphics	3.27	0.96
Accounting Systems	3.21	0.94	Accounting Systems	3.20	0.94
Internet Use	3.35	0.63	CAD	3.12	0.95

(table continues)

Character Skills	Preparation		Character Skills	Importance	
	M	SD		M	SD
Honesty	4.00	0.91	Honesty	4.72	0.46
Dependability	3.89	1.07	Dependability	4.72	0.46
Integrity	3.89	0.96	Integrity	4.72	0.46
Technical Competency	**Preparation**		**Technical Competency**	**Importance**	
	M	SD		M	SD
Physical Sciences	3.52	0.71	Agricultural	4.41	0.71
Biological Sciences	3.71	0.59	Mathematics	3.94	0.44
Humanities	3.06	0.82	Biological Sciences	3.71	0.58
Social Sciences	3.29	0.92	Physical Sciences	3.63	0.71
Mathematics	3.41	0.93	Social Sciences	3.31	0.87
Agricultural	4.00	1.02	Humanities	3.25	0.85

Employers value all of the character skills for entry-level employees. Honesty, dependability, and integrity were all rated as highly desirable and important traits. All received the same mean importance value of 4.72.

Agricultural science (Mean =4.41) was the technical competency rated as very important for AEED graduates. All of the other areas were rated as important with mathematics (M=3.94) being the next most important technical competency by employers. This was followed by biological and physical sciences, social sciences and humanities.

Objective 3

The third objective was to determine if differences exist in the level of preparation and the importance of the knowledge, skills and abilities of AEED graduates for entry level positions. The difference of the mean values between the ratings for preparation and the ratings for importance was computed. All mean values for preparation were lower than the mean of importance of each variable. The skill of teamwork was rated with the greatest difference of 1.00. With the exception of global awareness and creativity, all other skills ranked had a mean difference of .50 or greater. These values are shown in figure 1.

The differences of the means for communication skills are shown in figure 2. Verbalizing, presentation skills, listening, and understanding instructions were communication skills perceived by employers to be very important. All of the AEED graduates were rated lower for their preparation on these skills than the importance of the skill rating by the employer.

The greatest differences of preparation and importance on computer skills were the ability to access and use the Internet as shown in figure 3. Overall, mean differences in the computer skills were less than other skills noted by the employers. There were two skills, computer-aided design and computerized accounting systems, in which the importance of the skill was rated less important than the preparation level for entry level positions.

Employers rated character traits as the highest of all of the skills or abilities desired. All were rated by employers as very important. While AEED students were rated highly, employers placed a very high value on integrity and dependability. These differences are shown in figure 4.

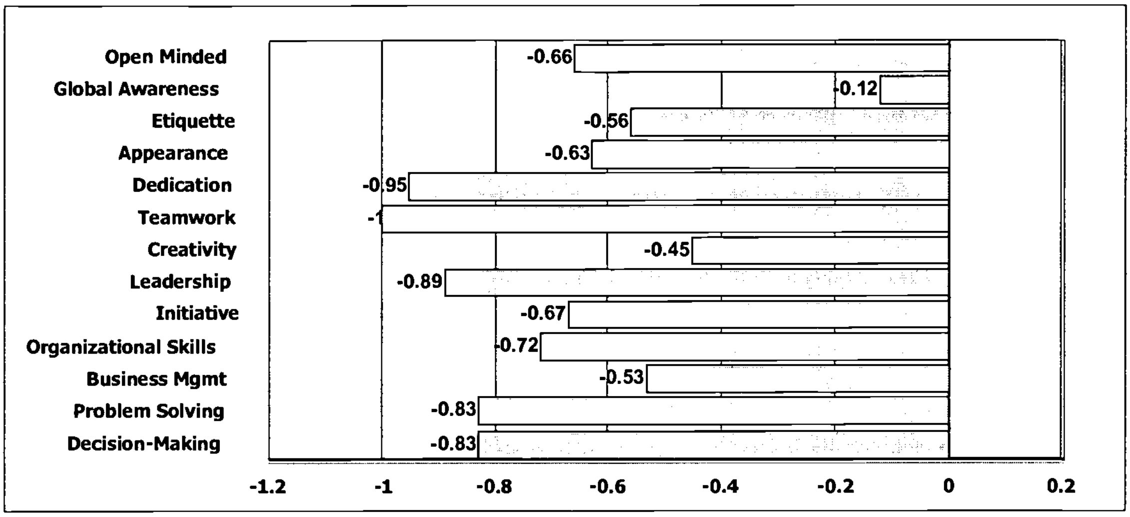

Figure 1. Mean of the Differences of Preparation and Importance of Interpersonal Skills

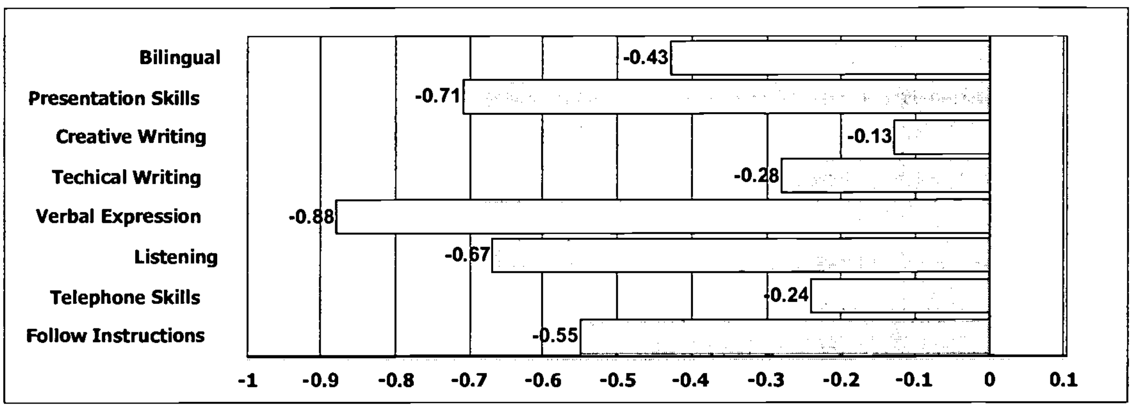

Figure 2. Mean Differences of Preparation and Importance of Communication Skills

Regarding technical skills, the mean differences of preparation and importance of mathematics and agricultural sciences were the greatest. These are shown in figure 5. Slight differences were found in social sciences and physical sciences with no difference of mean scores in the biological sciences area.

Objective 4:

Employers were also asked to rate a series of life experiences which they felt were important for success on the job for AEED graduates. These employers rated having general work experience as the most important experience (Mean =3.75) followed by having work experience on a farm (Mean=3.44) and being reared on a farm (Mean=3.11). All mean scores are shown in Table 2.

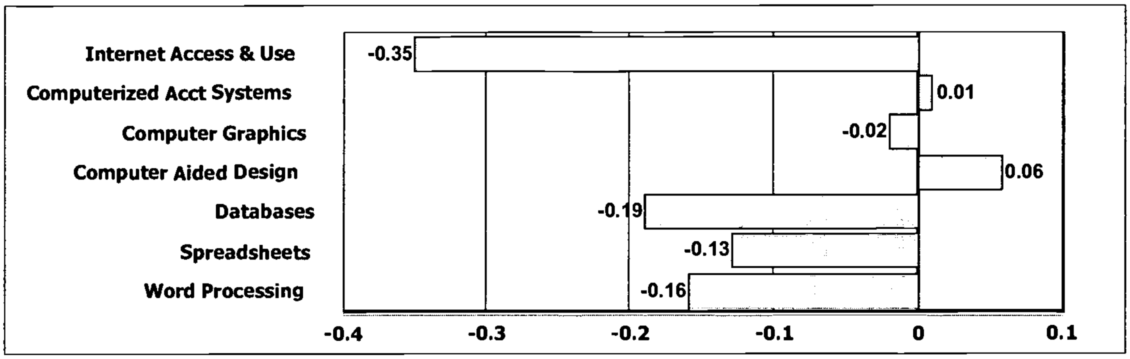

Figure 3. Mean Differences of Preparation and Importance of Computer Skills

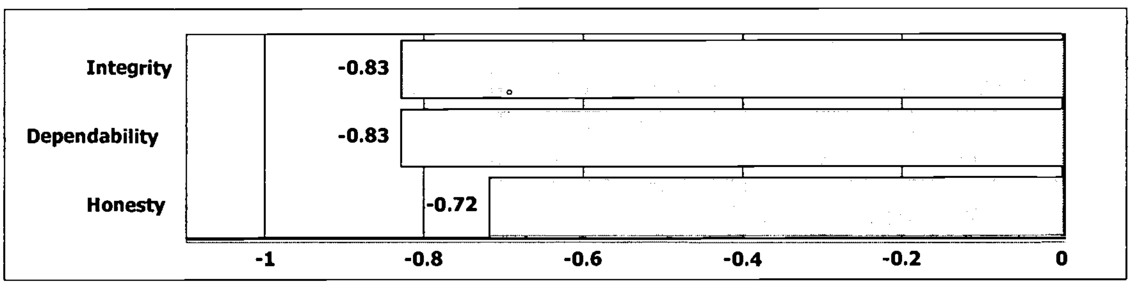

Figure 4. Mean Differences of Preparation and Importance of Character Traits

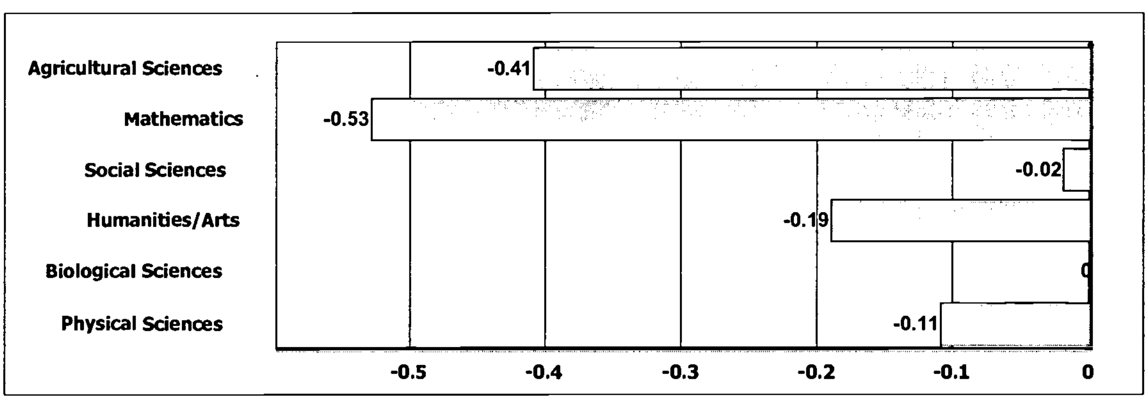

Figure 5. Mean Differences of Preparation and Importance of Technical Competencies.

Objective 5

Future growth areas that would impact or change agriculture for the next 5-10 years were ranked by these employers. The mean scores of these growth areas are listed in Table 3. The employers rated computer systems (Mean =5.86) and research and development (Mean=5.75) as the most likely areas to influence agriculture in the next 5-10 years. Technical consulting, environmental issues, and quality control were also rated as strong growth areas with mean scores of 5.63. The mechanical areas were perceived to have the least growth for the future.

Table 2

Mean Ratings of life experiences important for entry level agricultural and extension education graduates.

Life Experience	M	SD	Order
General Work Experience	3.75	0.71	1
Work experience on a farm	3.44	0.53	2
Agricultural employment	3.22	0.97	3
Reared on a farm	3.11	0.78	4
Officer of a student club	3.00	0.76	5
Agricultural internships	2.89	0.93	6
Active student club member	2.89	0.93	7
Bilingual	2.43	1.39	8
International experience such as exchange trips	2.50	0.93	9

Table 3

Growth areas which may impact agricultural and extension education graduates in the future.

Growth Areas	M	SD	Order
Computer Systems	5.86	0.69	1
Research and Development	5.75	0.88	2
Environment	5.63	0.52	3
Quality Control	5.63	0.52	3
Marketing	5.63	0.91	3
Consumer Relations	5.63	0.74	3
Education and Training	5.43	0.79	6
Communication	5.43	0.97	6
Management	5.13	0.99	8
Sales	4.75	1.03	9
International Agriculture	4.86	1.46	10
Mechanical	4.71	0.76	11

Conclusions and Recommendations

In general, AEED students are prepared to enter into entry level positions. Only the skill or ability to speak a second language was rated as unprepared by the employers of AEED graduates. However, when compared to the level of importance placed on the interpersonal skills and abilities, it appears that AEED students need to improve in the area of professionalism. Our graduates need to demonstrate the ability to work in groups, show leadership, dedication, and initiative more than they are now doing. It may also be that graduates exhibit "on-the-job awkwardness." These perceptions may simply be a lack of maturity or business savvy that all graduates have without a few years of on the job training. AEED students are proficient in computer skills, except the use of the Internet. CAD and accounting systems were rated as the least area of preparation. With the increased impact of the Internet, these skills will have a more immediate impact of need than some of the other computer skills. In the communication skills area, employers rated verbal expression, presentation skills, listening, and understanding instructions as very important. All character traits were very important to the employers.

Employers felt that having general work experience was an influencing factor for success for entry-level employees. They also felt having experiences in an agricultural work area and being raised on a farm were important for AEED graduates. Computer systems, research and development, the environment and quality control areas were rated as impact areas influencing the future of AEED graduates.

Based on these findings, it is recommended that the department examine the following changes in the curriculum to minimize the differences of the level of preparation and importance of each of these skill areas:

1. Explore the adoption of senior projects, colloquia, or other avenues to acquire skills in communication, problem solving, and decision-making.

2. Require more writing and presentation as part of the total degree program.

3. Incorporate more "hands-on" teaching in the class room. If agriculture is truly an applied science, then AEED students must be given the opportunity to apply the science they have learned in their course work. The employers have indicated our students are book smart, however, they lack the skills of a professional that comes from exposure to real situations.

4. Incorporate the use of computer skills with more course assignments.

5. Organize an advisory committee to seek ongoing input into the curriculum.

6. Continue to administer an employer and alumni study for feedback.

By continuing to solicit feedback from employers, the curriculum can be altered to provide agricultural and extension education students the skills and abilities necessary to be society ready graduates.

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High School Agricultural Communications Competencies: A National Delphi Study

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Abstract

The major purpose of this study was to identify competencies that should be achieved by high school students who complete courses in agricultural communications. Identification of the competencies came from industry leaders, high school agricultural education teachers, and agricultural communications university faculty.

A three-round Delphi technique was the principal procedure used to conduct the study with a total of 75 individuals being asked to participate in round one. In the first round, the panel identified 11 topic areas that should be included in a high school agricultural communications course: (1) Writing; (2) Computer/Information Technology; (3) Agricultural Industry; (4) Communications History; (5) Professional Development; (6) Research/ Information Gathering; (7) Ethics; (8) Public Relations/Advertising/ Marketing; (9) Leadership Development; (10) Legislative Issues; and (11) Communication Skills.

Resulting rounds produced 93 competencies within the 11 topic areas that were identified for potential inclusion in the high school curriculum. Of the 93 competencies, two were eliminated due to lack of agreement by the panel. Scholastic level ratings by the panel further reduced the number of competencies appropriate for high school students to 76 and categorized the remaining competencies according to appropriateness for introduction at the freshman, sophomore, junior and senior level.

Introduction

The National Research Council (1988), in its final report on agricultural education, spoke of the tremendous need for agricultural literacy and "education about agriculture." The Council recommended that agricultural education be expanded to include education in this area. Lockaby and Vernon (1998) contend that agricultural communications has always been an important component of the agricultural education program and an even closer relationship should exist. Birkenholz and Craven (1996) have noted agricultural communications is one of the most important aspects of agricultural education. Osborne and Phipps (1988) list skills in agricultural communications as one of the goals of agricultural education.

A national steering committee, charged with the concept of "reinventing agricultural education" (National Council for Agricultural Education, 1999), concluded that one of the major goals of agricultural education should be to enhance agricultural literacy skills. In 1999, the National FFA Organization, which conducts competitive events to test curricula knowledge of high school agricultural education students, started a national competition in agricultural communications. Approval of this competition by the National FFA Board of Directors is a clear indication of the recognized importance of agricultural communications as part of the high school agricultural education program.

In order for realistic priorities for instructional developments to occur, the curriculum planning process should involve all affected by the program. Those involved include teachers, employers, and employees (Diamond, 1989; Sprecker, 1996). Finch and Crunkilton (1989) indicate it is vitally important to ensure that curriculum content reflect the needs of the work force. Bailey-Evans (1994) contended that the explosion of knowledge in agriculture and a parallel revolution in communications has created a demand for curriculum evaluation in the area of agricultural communications. According to Sprecker (1996), the need for periodic examination of agricultural communications programs and curricula is acute. Bailey-Evans (1994) noted that agricultural communication curriculums should be continually expanded and updated to reflect the technological advancements of today and the future.

Sprecker (1996) noted the competencies needed to become an agricultural communicator have changed with technology and job requirements, and there is a pressing need to examine the agricultural communications curriculum. Terry et al. (1995) claim that specialization and scientific discovery in the field of food, agriculture, and natural resources has created a new need to communicate information about this area. If academic curriculum is to meet the needs of industry, "agricultural communications must continually survey professionals to determine the needs and skills required for a career in agricultural communications and then adjust the curriculum accordingly" (Sprecker & Rudd, 1998 p. 2).

Purpose And Research Questions

The major purpose of this study was to identify competencies that should be attained by high school students who complete courses in agricultural communications.

As a means of accomplishing the purpose, answers to three questions were sought:

1. What specific topics should be included in a high school curriculum for agricultural communications?
2. For each topic identified, what competencies should agricultural communications students possess upon completion of the program?
3. For each competency identified, at what scholastic level should they be introduced to the student?

Methodology

A three-round Delphi technique was the principal procedure used to conduct this study. A technique suggested by Anderson and Jones (1986) was used to select one segment of the panel of experts. State supervisors of agricultural education from all 50 states were used as third parties to nominate agriscience teachers in their state with a strong interest in agricultural communications. The nomination process resulted in 33 individuals from 27 states who served as the high school teaching experts for this study. The second segment of the panel of experts consisted of agriculture industry leaders. The individuals selected for this segment were the executive officers of seven agricultural communications-related professional organizations, which resulted in 21 individuals. The third subgroup of the panel of experts was university faculty that were teaching agricultural communications courses during the 1999-2000 school year. Twenty-one university faculty were included in the initial panel. The three subgroups comprised a total of 75 individuals who were asked to participate in Round One of the study.

From the reviewed literature, an open-ended questionnaire consisting of three questions was developed. These questions were validated for content regarding their appropriateness to the objectives of the study by a panel of faculty and graduate students. The instrument was pilot tested in Texas using agricultural communicators, agricultural students, and agriscience teachers who were not included in the selected panel of experts. Following completion of the pilot test, the researcher made revisions based on the results and suggestions from those involved in the pilot test.

The Round One questionnaire consisted of three open-ended questions. The panel of experts were asked to list several answers to each open-ended question under investigation. Frequencies, percentages, and rankings were used to summarize the responses to this round. Three independent readers completed this technique on the round one responses. The three readers then came together to collapse similar responses. Dillman's Total Design Method (1978) was used for non-response follow-up. A total response of 76% was achieved for this round.

In Round Two, the panel of experts was presented with an instrument which asked them to do two things: (1) rate the 82 competencies that emerged from Round One in terms of appropriateness for a high school agricultural communications curriculum, and (2) identify the scholastic level at which each competency should be introduced. The panel was asked to rate each competency using a four-point Likert-type scale with 1 = "Strongly Disagree," 2 = "Disagree, " 3 = "Agree," and 4 = "Strongly Agree." The scale was used to determine each panel member's level of agreement as to the inclusion of the competency in a high school agricultural communications curriculum. The researchers determined *a priori* that only those competencies receiving a 75% level of agreement or higher would be used for inclusion in the curriculum. In addition to evaluating the 82 competencies, panel members were asked to list additional competencies missed in Round One. They were also asked to identify the scholastic level where each competency should be introduced, using the following scale: 1 = "High School Freshman," 2 = "High School Sophomore," 3 = High School Junior, 4 = "High School Senior," and 5 = "College." The College category was included so the panel member could identify competencies they believe are too advanced for high school. Dillman's (1978) non-response follow-up procedures were followed. Forty-three of the 56 individuals responded for a total response rate of 77%. Frequencies, percentages, and ranks were used to evaluate the second round responses.

Round Three served as the final round for the study. Because of the consensus found on the 82 items in Round Two, only the 11 new competencies identified in Round Two were submitted to the panel in Round Three for members' evaluation. The instrument was sent to 41 of the 43 members who responded in Round Two. Two of the panel members indicated they would not be able to participate in the last round due to uncontrollable circumstances. Dillman's (1978) non-response follow-up procedures were followed. Thirty-six individuals responded for a total response rate of 88%. Frequencies, percentages, and rankings were used to evaluate the third round responses.

Findings

Research Question 1

The open-ended question regarding what topics should be included in a high school agricultural communications course produced 262 responses from the panel. Analysis of the responses produced the following 11 topic areas: (1) Writing; (2) Computer/Information Technology; (3) Agricultural Industry; (4) Communications History; (5) Professional Development; (6) Research/Information Gathering; (7) Ethics; (8) Public Relations/Advertising/ Marketing; (9) Leadership Development; (10) Legislative Issues; and (11) Communication Skills.

Research Question 2

Ninety-three competencies were identified and evaluated by the panel of experts. One hundred percent of the panel agreed or strongly agreed that ninety one competencies should be included in the high school agricultural communications curriculum. Competencies receiving 100% levels of agreement were "Identify the components and format of news releases," "Write a professional letter," "Utilize correct grammar," "Utilize correct spelling," "Utilize correct punctuation," "Identify what makes a topic newsworthy," "Utilize appropriate agricultural terminology," "Identify current issues and concerns in the agricultural industry," "List qualities of an effective communicator," "Identify the various career opportunities in agricultural communications," "Demonstrate professional/business etiquette," "Demonstrate a proper work ethic," "Demonstrate listening skills," "Research both sides of an issue," "Check facts," "Identify biased information," "Identify sources for information," "Discuss the role of public relations in agricultural companies," "Discuss the role of public relation in agricultural organizations," "Speak intelligently before a group," "Effectively utilize the Internet" and "Properly use a 35 mm camera."

Competencies receiving a 90-99% level of agreement were "Effectively interview a person" (97.7%), "Write a quality thank-you note" (97.7%), "Use e-mail properly" (97.7%), "Identify barriers to effective communication" (97.7%), "Interview for employment" (97.7%), "Work in a team activity" (97.7%), "Demonstrate proper phone skills" (97.7%), "Work under pressure" (97.7%), "Identify the importance of correctly reporting the facts" (97.7%), "Deliver a formal, oral presentation using clear enunciation, gestures, tone and vocabulary" (97.7%), "Give an effective interview" (97.7%), "Identify the basic workings of the government systems and how it affects the agricultural industry" (97.7%), "Properly use a digital camera" (97.7%), "Demonstrate different methods of communication" (97.6%), "Demonstrate the ability to cite sources" (97.1%), "Write a news story" (97.1%), "Discuss how current bills will affect agriculture" (97.0%), "Write a news release" (95.4%), "Accurately proofread a document" (95.4%), "Utilize the basic principles involved in technical writing" (95.4%), "Seek, gather and synthesize information" (95.4%), "Distinguish between right and wrong" (95.4%), "Properly use a video camera" (95.4%), "Write a feature story" (95.3%), "Write a caption for photos" (95.3%), "Perform basic word processing" (95.3%), "Converse knowledgeably on the different areas in agriculture" (95.3%), "Identify the key elements of a public relations campaign" (95.3%), "Utilize desktop publishing techniques" (95.2%), "Identify appropriate file formats when using scanning programs" (95.2%), "Demonstrate the ability to be an effective spokesperson for agriculture" (94.1%), "Determine whether a topic would be best covered in a news article or feature article" (93.1%), "Create a resume" (93.1%), "Identify various professional communication organizations" (93.1%), "Identify the importance of an advertising campaign" (93.0%), "Discuss the techniques and principles involved in public speaking" (93.0%), "Utilize correct parliamentary procedure" (93.0%), "Effectively scan a document" (92.9%), "Identify bias in media stories" (91.2%), "Identify different audiences" (91.1%), "Write for broadcast" (90.7%), "Effectively edit a story" (90.7%), "Write a speech" (90.7%), "Identify strategies to improve communication" (90.7%), "Prepare a public relations campaign" (90.7%), "Prepare a 4-6 minute speech within a 30-minute preparation time" (90.7%), "Deliver a radio broadcast" (90.7%), "Create and design a web page" (90.5%), "Target different audiences" (90.6%) and "Develop a multimedia presentation" (90.5%).

Competencies receiving a 80-89% level of agreement were "Write for the web" (88.4%), "Discuss libel law" (88.4%), "Discuss the Freedom of Information Act" (88.4%), "Deliver a TV broadcast" (88.4%), "Identify current legislative bills that affect agriculture" (88.2%), "Discuss the role of public relations in advertising agencies" (86.1%), "Describe the history of agricultural communications" (86.0%), "Describe the communications model" (86.0%), "Demonstrate sales skills" (86.0%), "Utilize graphic editing programs" (85.7%), "Discuss the importance of belonging to professional organizations" (85.3%), "Interpret statistics" (83.8%), "Identify the basics of corporate communications" (83.8%), "Utilize an Associated Press stylebook" (83.7%), "List the benefits of attending professional organization meetings" (82.3%), and "Define media literacy" (80.9%).

Competencies receiving a 75-79% level of agreement were "Identify the steps in the printing/developing process" (79.0%), "Interpret the basics of the commodities market" (76.8%), and "Apply common sense logic to an economic trend analysis" (76.7%).

Two competencies did not meet the 75% agreement criteria. The two competencies were "Analyze and apply technical data and procedures found in service manuals" (69.0%), and "Utilize a nonlinear video-editing program" (65.0%).

Research Question 3

The ninety-three competencies were categorized by the 11 topics that were identified. Within each topic area, the panel identified the scholastic level at which each competency should be introduced. Mode responses for the scholastic level of introduction were identified and used in reporting the results.

Introduction Level for Writing Competencies

The panel determined it was appropriate to introduce all of the writing competencies at the high school level. For five of the competencies, a majority of the panel believed they should be taught at the freshman level. These five competencies and the percentage of the respondents who believed they should be introduced at the freshman level were "Write a quality thank-you note" (73.8%), "Utilize correct spelling" (73.2%), "Utilize correct punctuation" (73.2%), "Utilize correct grammar" (70.7%) and "Write a speech" (50.0%). The panel was evenly divided in their agreement that one writing competency , "Identify what makes a topic newsworthy," should be introduced at the sophomore level (35.7%) or the junior level (35.7%).

Twelve additional writing competencies were identified as best introduced at the junior level. Those competencies with a mode level of agreement at the junior level were "Identify what makes a topic newsworthy" (48.8%), "Create a resume" (47.6%), "Write a news story" (44.4%), "Write captions for photos" (42.9%), "Determine whether a topic would be best covered as a news article or feature article" (40.5%), "Accurately proofread a document" (40.5%), "Write a professional letter" (39.5%),"Utilize an associated press stylebook" (39.0%) "Write a news release" (38.1%), "Write for the web" (35.7%), "Write a feature story" (33.3%), "Effectively edit a story" (33.3%) and "Effectively interview a person" (28.6%). The last three competencies, "Write a feature story," "Effectively edit a story," and "Effectively interview a person" had a bi-modal level of agreement, with the same percentage rating them as being best introduced at the senior level.

Two competencies were also rated as being best introduced at the senior level, according to the mode level of agreement. Those two competencies were "Write for broadcast" (39.5%) and "Utilize the basic principles involved in technical writing" (26.2%).

Introduction Level for Computer/Information Technology Competencies

The panel found that it was appropriate to introduce all but one of the computer/information technology competencies at the high school level. A majority of the panel indicated three of the competencies were best introduced at the freshman level. These three competencies and their level of agreement with freshman introduction were "Perform basic word processing" (76.7%), "Use e-mail properly" (55.8%) and "Effectively utilize the Internet" (52.8%).

Three computer/information technology competencies were identified as being best introduced at the junior level, according to the mode level of agreement. These competencies and their respective levels of agreement for junior introduction were "Effectively scan a document" (31%), "Develop a multimedia presentation" (26.2%) and "Utilize graphic editing programs" (26.2%). The last competency, "Utilize graphic editing programs," was bi-modal with 26.2% of the panel agreeing that it should be best taught at the senior level. Other competencies rated as senior level for introduction were "Create and design a web page" (34.9%), "Utilize desktop publishing techniques" (33.3%) and "Identify appropriate file formats when using scanning programs" (31.0%). The final competency in the computer/information technology topic, "Utilize a nonlinear video-editing program," was rated by a majority of the panel (60.0%) as being best introduced at the college level.

Introduction Level for Agricultural Industry Competencies

The panel found all three agricultural industry competencies are suitable for introduction at the high school level. Nearly one-half (48.8%) of the panel believed one competency, "Utilize appropriate agricultural technology," should be introduced at the freshman level.

Although the panel was more divided as to where the competency "Identify current issues and concerns in the agricultural industry" should be introduced, the most common response was introduction at the sophomore level (27.9%). The most common response for the final competency, "Converse knowledgeably on the different areas in agriculture," was evenly split between introduction at the junior level and introduction at the senior level (25.6% each).

Introduction Level for Communication History Competencies

One communication history competency had a wide range of opinions as to when it should be introduced. The most common response for introduction of the competency, "List qualities of an effective communicator," was evenly split between the freshman and junior level (27.9% each). The remainder of the communication history competencies had junior level introduction as the most common response by the panel. These competencies and the percentage of the panel who agreed they should be introduced at the junior level were "Identify barriers to effective communication" (46.5%), "Identify strategies to improve communication" (39.5%), " Describe the communications model" (35.7%), "Define media literacy, basic elements and techniques" (35.7%), "Describe the history of agricultural communications" (32.6%) and "Demonstrate different methods of communications" (31.0%).

Introduction Level for Professional Development Competencies

The panel's most common response for nearly one-half of the competencies in professional development was freshman introduction. These competencies and the percent of the panel who agreed with freshman introduction were "Demonstrate listening skills" (61.9%), "Work in a team activity" (52.4%), "Demonstrate proper phone skills" (46.5%) and "Demonstrate proper work ethic" (46.5%). Two competencies, "Work under pressure" (41.9%) and "Demonstrate professional/business etiquette" (33.3%) most common rating was junior level. Three competencies, "Interview for employment" (39.5%), "Identify various professional communications organizations" (38.1%) and "Identify the various career opportunities in agricultural communications" (35.7%) were most commonly rated as senior level. Two competencies "List the benefits of attending professional organization meetings" (41.7%) and "Discuss the importance of belonging to professional organizations" (33.3%) were most commonly rated as college level.

Introduction Level for Research/Information Gathering Competencies

The panel rated most of the research/information gathering competencies as advanced, with the most common rating for all but one competency at the junior level or above. The competency, "Demonstrate the ability to cite sources correctly," had 31.4% of the rating it as freshman level. Five competencies were found to be appropriate at the junior level. Those competencies and the percentage of panel members that rated the competency as junior level were "Identify biased information" (44.2%), "Identify sources for information" (42.9%), "Check facts" (41.9%), "Research both sides of an issue" (39.5%) and "Analyze and apply technical data and procedures found in service manuals" (31.7%).

The competency "Seek, gather and synthesize information" was most commonly rated as senior level (30.2%). The last research/information gathering competency, "Interpret statistics," had the same percentage of panel members (34.9%) rating the competency at senior and college level, which were the most common responses.

Introduction Level for Ethics Competencies

There were three competencies under the topic of ethics in this survey. One competency, "Distinguish between right and wrong," was rated by a majority of the panel (69.0%) as a freshman level competency. One competency, "Identify bias in media stories," had an equal percentage of panel members (27.8%) rating it both junior and senior level. The other ethic competency, "Identify the importance of correctly reporting the facts," had two common responses with an equal number of panel members rating this competency as a freshman level or junior level (31.0% each).

Introduction Level for Public Relations/Advertising/Marketing Competencies

One-half of the public relations/advertising/marketing competencies had a most common rating of junior level. The junior level competencies and the percentage of panel members that rated them as junior were "Identify the key elements of a public relations campaign" (37.2%), "Discuss the role of public relations in agricultural companies" (37.2%), "Discuss the role of public relations in farm organizations" (34.9%), "Demonstrate sales skills" (28.6%), "Identify the importance of an advertising campaign" (27.9%), and "Identify different audiences" (27.8%). Two of the above mentioned competencies "Discuss the role of public relations in farm organizations" and "Identify the importance of an advertising campaign" had the same number of panel members rating them as senior level.

The competency, "Prepare a public relations campaign," had equal percentages of panel members (37.2%) rating it as a senior or college level for the most common responses. Five additional competencies had college level as the most common response. These competencies and the percentage of members that rated them as college level were "Apply common sense logic to an economic trend analysis" (50.0%), "Identify the basics of corporate communications" (44.2%), "Interpret the basics of the commodities market" (41.5%) and "Discuss the role of public relations in advertising agencies" (38.1%), and "Target different audiences" (30.6%).

Introduction Level for Leadership Development Competencies

The majority of the leadership development competencies had frequent rating of freshman level. The freshman level competencies and the percentage of the panel agreeing with freshmen introduction were "Utilize correct parliamentary procedure" (65.0%), "Discuss the techniques and principles involved in public speaking" (64.3%), "Deliver a formal, oral presentation using clear enunciation gestures, tone and vocabulary" (54.8%), and "Speak intelligently before a group" (39.0%).

The final three leadership development competencies were most commonly rated as junior level. The three competencies and the percentage of panel members that rated them as junior level were "Give an effective interview" (47.6%), "Prepare a 4-6 minute speech within a 30-minute preparation time" (41.5%) and "Demonstrate the ability to be an effective spokesperson for agriculture" (34.3%).

Introduction Level for Legislative Issues Competencies

The panel's most common rating for introduction of each of the legislative issue competencies was at either the senior or college level. One competency, "Identify the basic workings of the government system and how it affects the agricultural industry" had 48.8% of the panel rating it as senior level. One competency, "Discuss how current bills will affect agriculture," had the same percentage (41.7%) of panel members rating it as senior or college level. The other three competencies, "Discuss libel law" (51.2%), "Identify current legislative bills that affect agriculture" (47.1%) and "Discuss the Freedom of Information Act" (44.2%), were most commonly rated as college level competencies (51.2% and 44.2%, respectively).

Introduction Level for Communication Skills Competencies

One communication skill competency, "Properly use a 35 mm camera," had a tie for the most common response with 32.6% of the panel members rating it for introduction at either the sophomore or junior level.

Three competencies were most commonly rated as being appropriate for introduction at the junior level. Those three competencies and the percentage of panel members rating it at the junior level were "Properly use a digital camera" (40.5%), "Properly use a video camera" (31.0%) and "Identify the steps in the printing/developing process" (26.2%). The final two communication skill competencies were most commonly rated as college level. The two competencies and the percentage of panel members rating them as college level were, "Deliver a radio broadcast" (35.7%), and "Deliver a TV broadcast" (42.9%).

Conclusions

The conclusions for the study are based on interpretations of data presented in the study and are restricted to the populations surveyed. It is important to note that mode responses from the panel were used to determine when a competency should be introduced. In several instances where the response was bi-modal, the highest scholastic level of introduction was utilized to interpret the results. Based on this information, the researchers make the following conclusions:

1. The following topic areas are appropriate for use in developing a curriculum in agricultural communications for high school students:
   - Writing
   - Computer/Information Technology
   - Agricultural Industry
   - Communications History
   - Professional Development
   - Research/Information Gathering
   - Ethics
   - Public Relations/Advertising/Marketing
   - Leadership Development
   - Legislative Issues
   - Communication Skills

2. The following represents the major topic areas and competencies that should be utilized in developing an introductory agricultural communications curriculum for high school freshmen and sophomores:

   Writing - Write a quality thank-you note; Utilize correct spelling; Utilize correct punctuation; Utilize correct grammar; and Write a speech.

   Computer/Information Technology – Perform basic word processing; Use e-mail properly; and Effectively utilize the Internet.

   Agricultural Industry – Utilize appropriate agricultural terminology; and Identify current issues and concerns in the agricultural industry.

   Professional Development – Demonstrate listening skills; Work in a team activity; Demonstrate proper phone skills; and Demonstrate a proper work ethic.

   Research/Information Gathering – Demonstrate the ability to cite sources correctly.

   Ethics – Distinguish between right and wrong.

   Leadership Development – Utilize correct parliamentary procedure; Discuss the techniques and principles involved in public speaking; Deliver a formal, oral presentation using clear enunciation, gestures, tone and vocabulary; and Speak intelligently before a group.

3. The following represents the major topic areas and competencies that should be utilized in developing an intermediate agricultural communications curriculum for high school juniors:

   Writing – Identify what makes a topic newsworthy, Identify the components and format of news releases, Create a resume, Accurately proofread a document, Write a professional letter, Utilize an Associated Press Stylebook, Write a news release, Write for the web, and Write a news story.

   Computer/Information Technology – Effectively scan a document; and Develop a multimedia presentation.

   History – Describe the history of agricultural communications; Demonstrate different methods of communications; List qualities of an effective communicator; Identify barriers to effective communication; Define media literacy, basic elements and techniques; Identify strategies to improve communication; and Describe the communication model.

   Professional Development – Develop the ability to work under pressure; and Demonstrate professional/business etiquette.

   Research/Information Gathering – Identify biased information; Identify sources of information; Check facts; and Research both sides of an issue

   Ethics – Identify the importance of correctly reporting the facts.

   Public Relations/Advertising/Marketing – Identify the key elements of a public relations campaign; Discuss the role of public relations in agricultural companies; Demonstrate sales skills; and Identify different audiences.

   Leadership Development – Give an effective interview; Prepare a 4-6 minute speech within a 30-minute preparation time; and Demonstrate the ability to be an effective spokesperson for agriculture.

   Legislative Skills – Identify the basic workings of the government system and how it affects the agricultural industry.

Communications Skills – Properly use a 35 mm camera; Properly use the digital camera; Properly use a video camera; and Identify the steps in the printing/ developing process.

4. The following represents the major topic areas and competencies that should be utilized in developing an advanced agricultural communications curriculum for high school seniors:

   Writing – Write a feature story; Effectively edit a story; Effectively interview a person; Write for broadcast; and Utilize the basic principles involved in technical writing.

   Computer Information Technology – Utilize graphic editing programs; Create and design a web page; Utilize desktop publishing techniques; and Identify appropriate file formats when using scanning programs.

   Agricultural Industry – Converse knowledgeably on the different areas in agriculture.

   Professional Development – Interview for employment; Identify various professional communications organizations; and Identify the various career opportunities in agricultural communications.

   Research/Information Gathering – Seek, gather and synthesize information.

   Public Relations/Advertising/Marketing – Discuss the role of public relations in farm organizations; and Identify the importance of an advertising campaign.

   Legislative Issues – Identify the basic workings of the government system and how it affects the agricultural industry.

   Ethics – Identify bias in media stories.

5. The following represents major competencies that are not suitable for high school instruction, but rather should be introduced at the college level:

   - Utilize a nonlinear video-editing program; Interpret statistics; Prepare a public relations campaign; Apply common sense logic to an economic trend analysis; Identify the basics of corporate communications; Interpret the basics of the commodities market; Discuss the role of public relations in advertising agencies; Discuss libel law; Discuss the Freedom of Information Act; Deliver a radio broadcast; Deliver a TV broadcast; Discuss how current bills will affect agriculture; Identify current legislative bills that affect agriculture; List the benefits of attending professional organization meetings; Discuss the importance of belonging to professional organizations; and Target different audiences.

Recommendations

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

1. The seventy-six competencies identified in this study should be utilized to develop curriculum materials for high school agriscience students. The materials should be developed in three separate units: (a) Introductory Agricultural Communications, (b) Intermediate Agricultural Communications, and (c) Advanced Agricultural Communications. The introductory unit should be utilized for high school freshman and sophomores, the intermediate unit for high school juniors, and the advanced unit for high school seniors.
2. In order to facilitate the development of such curriculum materials, the list of competencies should be disseminated to agricultural educators in the nation. Potential

disseminators include the National FFA Organization, the U. S. Department of Education, and the National Council for Agricultural Education.

3. Curricula using these competencies should be pilot tested to determine if changes/additions are needed.
4. The National FFA Organization should utilize the competencies in developing and implementing the new National FFA Agricultural Communications Career Development Event.
5. Additional studies should be conducted on the state or regional level to determine if changes or additions need to be made in the competencies in order to be most effective within a particular state or region.

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AN EXAMINATION OF TEXAS AGRICULTURAL EDUCATION SAFETY PROGRAM PROCEDURES

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Abstract

Agricultural education programs in public schools serve many purposes including educational enrichment, experiences in responsibility, self-motivation and teamwork, as well as instruction in technical agriculture. In these programs students are exposed to safety hazards commonly experienced in agricultural operations. With the overwhelming burden placed on administrators the issue of safety in agriculture programs is largely ignored.

In this study one hundred agricultural education programs in Texas were randomly selected for geographic and school size diversity. Ninety-four of the programs were visited by the investigators, using a researcher developed checklist. The facility inspections and teacher interviews covered twelve different areas concerning the agricultural education safety program. The checklist provide for a consistent basis for focusing on the purpose of the study. The purpose of this study was to evaluate the administration and safety instruction of agricultural education programs within Texas.

The findings are: (1) Of the ninety-four schools surveyed a majority (95.6%) offer agricultural mechanics classes in a shop/laboratory environment. Of the teachers interviewed (78), the investigators found that a majority were male teachers and all had some formal training in safety either in college related courses or from an industry experience. However, only 27.3% of the teachers reported had chemical handling training/certification. (2) Although the majority of the programs relied on the teacher for facility inspections only sixty (78.9%) indicated that accident reports were completed and safety issues documented. Overall, in the area of administrative procedures the majority of the schools surveyed did not have or follow only very basic steps to reduce the likelihood of injury in their facilities. (3) In the area of safety instruction the schools appeared to do much better. Over ninety percent of the programs used safety exams, teacher and student demonstrations and documented safety instruction in lesson plans. A disturbing issue is that only 78.9 percent of the programs required mastery of safety by the students and even fewer utilized other avenues for safety instruction or documented the students efforts in mastery.

With the burden of facility management on the agricultural teacher they must be provided the administrative support to effectively manage and teach safety. In general the teachers fail to develop a total culture of safety and hazard elimination within their programs. These findings and conclusions will guide a future research design in the development of a behavior based safety model for implementation in the agricultural education classroom.

Introduction

Over the past several years, concerns for the health and safety of student populations in Texas have grown in importance. Many school districts have complicated this issue by demands on improving state-mandated test scores and through Texas policy of local control and site-based management. Violence in public schools has further frustrated the attempts of school administrators to create a healthy and safety environment for students and has further strained resources. These unfortunate events have resulted in less attention being placed on career and technology (vocational-based) programs and in financial neglect of career and technology laboratory facilities in favor of computer labs or other, hi-tech courses that have emphasized test taking skills and in procedures necessary to reduce the chance of catastrophic violence. This is notably consequential in the case of student health in laboratories stocked with dangerous equipment and supplies.

According to the National Institute of Occupational Safety and Health (2000) young people under 20 face a serious risk of death and injury from work-related injuries. Furthermore, the U.S. Department of Health and Human Services (DHHS, 1990) stated that the greatest cause of concern for the health of children and adolescents has become unintentional injuries. The health and welfare of students must be the top priority of educators and administrators (Padham, 1990). Instructors are on the front lines and have the majority of the responsibility for providing a safe and healthy environment. However, administrators are the pacesetters, when it comes to the safety and health of students. Agricultural education teachers typically deliver instruction to students in laboratory settings. While students are seldom injured in school (Baker, 1988), the nature of the laboratory setting increases the chance of injury and exposure to contagions and chemicals.

Developing a positive attitude toward student well being starts with the attitude and practices of the teacher and school administration. Ullrich (1997) recommended that to promote a sense of urgency for safety education, administrators should develop a written safety plan and a detailed documentation system. Additionally, Newcomb, McCracken and Warmbrod (1993) maintained safety instruction is largely a question of personal attitude and instructional practices that impact the affective domain. Addressing Texas agriscience teachers specifically, Lawver and Fraze (1996) recommended more pre-service and in-service education in the areas promoting positive safety attitudes. Teachers are student role models and their actions speak louder and more powerfully than all the handouts or lip service paid to the contrary (Jones, 1987). Student health protection issues are of the utmost importance and teachers and administrators must be committed to achieving a positive safety climate. A school's safety philosophy should commit to providing a safe environment and make it clear that teachers and administrators are responsible for the overall well being of the students when involved with all activities inclusive of the classroom, laboratory, and off campus events. A documented safety philosophy and policy are necessary to demonstrate the commitment to a health environment for students (Padham, 1990).

School district administrators, both on campus and in central offices, have a crucial role in assuring that students and teachers work and learn in an environment that is safe (Carter, 2000.). Administrators of agricultural education programs as well, cannot begin to control risk until they fully understand the nature and extent of potential hazards. They cannot begin to understand those hazards until they have collected and analyzed requisite safety information and selected appropriate forms of intervention. For a schools, agricultural education, safety program to be effective, it must be based on comprehensive information about the current state of safety, the major impediments to a safe environment, and the identification of resources that can be employed most productively to create a safe school (Rowland, 1999).

In addition to positive role modeling and administrator awareness and support, agricultural educators must consistently include safety instruction in their curriculum. It is essential that students learn the proper methods of performing tasks in potentially dangerous work environments. A good safety attitude by itself will not completely protect the unwary and naï ve. Knowledge of safety precautions, learned safety skills, and the ability to foresee the possibility of injury are all key factors in building a complete safety consciousness (Gempler's, 2001). In the case of educators, they must develop a classroom safety and management system that will prove consistent and supportive in the day-to-day application of safety rules and practices. As with other aspects of classroom management, a consistent and positive approach is key to successful implementation. The implementation of a safety-management program cannot be seen as an inconvenience but rather viewed as the central educational challenge, and one particularly important to the learning process.

Healthy People 2000 (DHHS, 1990) suggested that ages 15 through 24 are a time when young people develop behaviors that may become permanent and that health and safety issues need to be clarified. This situation presents a special challenge for career and technology education programs that are tied to dangerous occupations such as agricultural education is to agriculture. It is well known that agriculture is one of the most dangerous occupation areas (National Safety Council, 1996).

Students desiring employment in a hazardous occupation need proper safety instruction to protect them in both the present and the future work environments. Students in agricultural education programs commonly use equipment and devices, identical to that used in industry. Sullivan (1990) acknowledged vocational teachers are responsible for the safety of their students because of moral obligations and assigned duties for providing a safe environment for their students. It is also understood that preventable and unfortunate injuries occasionally occur in classrooms, laboratories, during field experiences and while managing supervised agricultural experience programs. Consequently, the most important responsibility of the agriculture instructor is to ensure safety of the students (Daniels, 1980)

Research addressing safety standards, safety attitudes and other concerns is presented in countless texts, journals and magazine articles. The majority of on-the-job [as well as school related] injuries are the result of unsafe acts rather than equipment or procedural failures. Safety experts estimate that about 300 unsafe acts occur before a single injury results from this unwanted behavior (Bolender, 1992). When considering agricultural education, safety concerns have been revealed across the country and illuminated most specifically by the following studies: Berkey, 1981 & 1994; Kigin, 1983; Gleim and Hard, 1988; Lawver, 1994; Schlautman and Silletto, 1992; Swan, 1993; and, Hubert, 1996. A Swan (1993) study recommended designating local and federal funds for use in improving safety and emergency equipment and instruction available to instructors and students.

Agricultural Education programs are often comprised of a variety of facility types and emphasis areas. These areas include but are not limited to the following: hot and cold metal work; wood working; paints and preservers; greenhouse and horticultural enterprises; aquaculture; wildlife and environmental management; animal sciences and management; plant and soil sciences; machinery / engine repair and mechanics; and aspects of construction trades. As such, programs offer a variety of classes, supervised agricultural experience programs [projects], school-to-work offerings and community interactions that apply knowledge and skills from this large variety of emphasis areas. Unfortunately, many administrators assume that because the teacher is certified in Agricultural Education the teachers have the comprehensive knowledge and expertise to monitor all aspects of the program including safety regarding respective equipment and facilities. This misconception may lead to administrator complacency where safety programming is concerned unless a systematic and continuous effort is made to address specific safety and health issues in the various aspects of the program.

In most programs safety topics are covered, albeit in various degrees, within specific lessons for tool or equipment usage or within a unit of instruction (Hubert, Ullrich and Murphy 2000). Interestingly, teachers often overlook the significance of safety instruction and supervision in spite of the litigation potential from incurred personal injuries in the laboratory. As Gliem and Hard (1988) discovered, teachers of agriculture, school administrators, and boards of education were extremely vulnerable to being found negligent and liable if a student were injured in the agriculture shop. In the course of skill development, evidence has suggested students will be more safety conscious if teachers also follow proper safety practices, demonstrate accurate safety knowledge, provide a safe laboratory environment, convey a positive safety attitude, and relay safety expectations to students (Harper, 1984). It must be remembered that the teacher is responsible for promoting desirable attitudes, enforcing consequences to rules violations and monitoring the safety climate (Kigin, 1983). If major portion of laboratory supervision by the teacher should be to emphasize and demonstrate safety and provide feedback on students' safety procedures and provide relevant feedback and reinforcement (Phipps and Osborne, 1988) and a student learns what is practiced (Crunkilton and Krebs, 1982) then unsafe student behaviors put a program at risk.

A well-developed and implemented safety-management program will not only protect students from preventable injuries, and protect teachers, administrators and school boards from charges of negligence but also assist in fostering positive, lifelong safety student attitudes towards safety in their work environments. Attitudes and practices that are developed and modeled for students, and then positively reinforced on a systematic basis are not apt to diminish substantially over time (Rowland, 1999). A proactive thorough safety program grounded in positive teacher attitudes toward protecting students is fundamentally important in laboratory situations involving tools, machinery, animals, plants, chemicals, supplies, and techniques which, if not properly practiced are undeniably more dangerous. Thus safety in agricultural education programs is not to be addressed only in the classroom—it is something that should be modeled, demonstrated, emulated, and practiced continually and created from carefully developed administrative and educational procedures. It is obvious that agricultural education, as well as other career and technology (vocational) programs must improve upon and follow detailed safety/risk management plans to protect student from preventable injury and districts from unnecessary litigation.

Purpose / Objectives

The purpose of this study was to assess compliance with administrative and safety instruction procedures in agricultural education programs in Texas.

1. Identify and describe selected demographics of the agricultural education teacher and facilities.

2. Identify and describe selected administrative procedures in comprehensive high schools with agricultural education programs.

3. Identify and describe selected safety instruction procedures in comprehensive high schools with agricultural education programs.

Methods / Procedure

A stratified random sample of 100 Agricultural Education programs in Texas was selected from the Vocational Agriculture Teachers Association of Texas (VATAT) database of Agricultural Education programs. Ten schools were selected from each of the ten VATAT / FFA areas to create geographic randomness. To further randomize the sample according to school district size, two schools from each of the five different University Interscholastic League (UIL) classifications were selected within each area. The division levels for Texas high school competitions are based on enrollments and are divided as follows: 5A (1,780 students or greater), 4A (780-1,779 students), 3A (345-779 students), 2A (160-344 students), and 1A (159 students or fewer) (UIL, 1999).

The researchers developed a booklet type instrument based on a review of the literature and existing instruments. The instrument was developed into 12 sections: Demographics, Administrative Procedures, Safety Instruction, Walking / Working Surfaces, Means of Egress, Fire Protection, Personal Protective Equipment, Tools and Equipment, Welding, Cutting and Brazing, Electrical, Compressed Air Equipment and Environmental Controls. Teacher educators, state agricultural education staff from Texas and Oklahoma, industrial and occupational researchers and agricultural educators served as a panel of experts to review the instrument for face and content validity. Appropriate revisions were completed based on comments.

To carry out the objectives of the study it was determined data was to be collected through direct observation and interviews at each school site. Two schools in a central, geographic location to the researchers were selected for pilot testing the final version of the instrument. By meeting to complete two, onsite assessments, consensus was gained with respect to expectations of each instrument item. Schools' agricultural education teachers, as well as the school administration, were contacted concerning participation in the study. Four researchers personally inspected and reviewed 94 of the selected schools during the spring and summer of 2000. Six sites were unavailable for review. Two sites were being demolished or remodeled and new construction was underway. Two sites did not have laboratory facilities, and two were unavailable due to time conflicts with the researchers.

Results

Objective one was to identify and describe selected demographics of the agricultural education teachers. Of the 78 teachers interviewed 94.3 percent were male and 5.1 percent were female, 94.6 percent were members of the Vocational Agriculture Teachers Association of Texas. The average time taught was 16.4 years. Nearly 80 percent of the teachers had taken one or more safety related courses in college. When asked if they had taken any type of safety related training from business or industry sources 39.4 percent had some type of training with the balance responding they had no training from these sources. Finally, 27.3 percent indicated they were chemical handling certified.

Objective one also sought to identify and describe selected demographics of the agricultural education facilities. Of the 94 programs inspected 95.6 percent had agricultural mechanics shops / laboratories, 28.1 percent of which were less than 10 years old, 29.2 percent were 11 – 20 years old and 42.7 percent were 21 years or more. School farms were identified in 41.6 percent of the schools with 26.7 percent being less than 10 years old, 30 percent being 11 – 20 years old and 43.3 percent being more than 21 years old. Greenhouses and horticulture areas were identified in 35.4 percent of the programs with 89.3 percent being less than 10 years old, 3.6 percent being 11 – 20 years old and 7.1 percent being over 21 years old. Barns were identified in 34.4 percent of the programs, with 31.1 percent being under 10 years old, 24.1 percent being 11- 20 years old and 44.8 percent being more than 21 years old. Almost 17 (16.7%) percent of the programs had animal handling facilities with 25 percent being less than 10 years old, 45 percent being 11 – 20 years old and 30 percent being more than 21 years old. Only 2.1 percent had aquaculture laboratory and all were less than 10 years old. A meats technology laboratory was identified in one program and was over 21 years old.

Objective two sought to identify and describe selected administrative procedures teachers utilize in comprehensive high schools with agricultural education programs. Table 1 displays data collected through interviews with agriculture teachers within the selected programs, concerning compliance with administrative procedures. The most commonly utilized administrative procedure was teacher inspection of the facility and equipment for safety problems with 72 (98.6%) of the programs involved. Sixty (78.9%) indicated accident reports were filed and safety concerns are documented. Safety contracts signed by the teacher and student were utilized by 51 (67.1%) of the teachers while 46 (60.5%) also require the parents to sign a safety contract. Insurance agents inspected the facilities and equipment for safety problems in 37 (48.7%) of the facilities. Similarly administrators inspected only 36 (47.4%) of the facilities. A disappointing 14 (18.4%) teachers indicated there was a written safety plan for the Career and Technology program while merely 13 (17.1%) had a written plan for their Agricultural Education program. Thirteen (17.1%) teachers also had a written enforcement or discipline plan for safety violations. To a lesser extent, 11 (14.1%) teachers stated that Material Safety Data Sheets (MSDS) were current and available.

Table 2 illustrates data addressing compliance with administrative procedures. Sixty-one (64.9%) of the facilities had appropriate first aid supplies readily available and in good condition. Cleanup schedules were posted in 17 (1.8%) of the facilities and evacuation procedures were posted in the laboratory and classroom in 14 (14.9%) of the facilities. Posted emergency phone numbers near the telephone were observed in 11 (11.7%) of the facilities.

The third objective sought to identify and describe selected safety instruction procedures in comprehensive high schools with agricultural education programs and is presented in Table 3. The overwhelming majority 74 (97.4%) of the teachers conducted hand and power tool safety demonstrations as part of their curriculum. A nearly identical number, 73 (96.1%), reported that the students were given safety exams. Seventy-two (94.7%) teachers required students to demonstrate hand- and power-tool safety before being allowed full access and use. Seventy (92.1%) teachers required a safety test prior to allowing students access to the laboratory while 69 (92.0%) documented safety instruction in their lesson plans and 68 (90.7%) kept students safety exams on file. Sixty (78.9%) required students to pass safety exams to 100% mastery level before being allowed access to the laboratory. To a much lesser extent 43 (57.3%) used field trips to emphasize safety in business and industry, while 41 (53.9%) used resource people to emphasize safety and / or first aid. Thirty-seven (48.7%) teachers documented teach-reteach instruction for those students not receiving 100% on the safety exam in their official grade book. Only seven (9.2%) used Computer Based Training (CBT) to emphasize safety and-/-or first aid.

Table 1

School Compliance with Administrative Procedures: Teacher Interviewed

	Compliance		
Administrative Procedures	n[a]	f[b]	%
Teacher inspects the facility and equipment for safety problems.	73	72	98.6
Accident reports are filed and safety concerns are documented.	76	60	78.9
Safety contracts signed by the teacher and the student are utilized.	76	51	67.1
Safety contracts signed by the teacher, student, and parent(s) are utilized.	76	46	60.5
An insurance agent inspects facility and equipment for safety problems.	76	37	48.7
Administrator inspects facility and equipment for safety problems.	76	36	47.4
There is a written safety plan for the Career and Technology Program.	76	14	18.4
There is a written safety plan for your Agricultural Education Program.	76	13	17.1
Your Agricultural Education Program has a written enforcement or discipline plan for safety violations.	76	13	17.1
Material Safety Data Sheets (MSDS) are current and available.	78	11	14.1

[a]number responding to item; [b]frequency in compliance with procedure

Table 2

School Compliance with Administrative Procedures: Researcher Observed

	Compliance		
Administrative Procedures	n[a]	f[b]	%
First aid supplies are readily available and in good condition.	94	61	64.9
A student cleanup schedule is posted to help organize facility cleaning.	94	17	18.0
Evacuation procedures are posted in the laboratory/shop and classroom.	94	14	14.9
Emergency phone numbers are posted near the phone.	94	11	11.7

[a]number responding to item; [b]frequency in compliance with procedure

Table 3

School Compliance with Safety Instruction: Teacher Actions -

Safety Instruction	n[a]	f[b]	%
	Compliance		
Teacher conducts hand and power tool safety demonstrations.	76	74	97.4
Students are given safety exams.	76	73	96.1
Students demonstrate hand and power tool safety before being allowed to use them.	76	72	94.7
Safety test[s] given to each student prior to laboratory access.	76	70	92.1
Lesson plans document safety instruction.	75	69	92.0
Students' safety exams are kept on file.	75	68	90.7
Students must pass safety exams to 100% mastery.	76	60	78.9
Field trips are used to emphasize safety in business and industry.	75	43	57.3
Resource people are utilized to emphasize safety and / or first aid.	76	41	53.9
Teaches grade book documents teach / reteach instruction for students not receiving 100% on safety exam.	76	37	48.7
Computer Based Training [CBT] is utilized to emphasize safety and / or first aid.	76	7	9.2

[a]number responding to item; [b]frequency in compliance with procedure.

Table 4 displays data concerning safety instruction and the types of materials provided and presented by the teachers. Seventy-four (97.4%) teachers stated that students were provided and presented materials on tool as well as equipment safety. To a slightly lesser extent, 73 (96.1%), the students were provided and presented materials on electrical safety while 72 (94.7%), were provided and presented material on eye protection and safety. Seventy-one (93.4%) of the teachers provide and present students materials on fire safety. Sixty-three (82.9%) provided and presented students material on animal handling safety while 60 (78.9%) provided and presented material on chemical safety.

To a much lesser degree instruction in biohazard safety was provided by 46 (60.5%) teachers. Students were provided and presented material on greenhouse safety by fewer than half (36, 47.4%) of the teachers. Furthermore, 18 (23.7%) provided students with basic first aid instruction while only three (3.9%) made CPR instruction available.

Conclusions

Demographic data of the stratified, random sample of Texas agricultural education programs revealed that agricultural education teachers in Texas were largely male and members of the Vocational Agriculture Teachers Association of Texas. While many teacher education programs have discounted and even discontinued instruction in agricultural mechanics, over 95% of secondary teachers work in programs with laboratories in this area. Continuing to under prepare secondary teachers for this important and complex role invites disaster. The agricultural mechanics laboratories, school farms, animal handling and barn facilities were largely older and may need special attention due to deterioration. It also appears that the numbers of greenhouse and horticultural facilities have increased during the past ten years. These biological laboratory settings bring with them additional requirements for safety instruction in chemical handling and biological containment. Given the importance of the role, it was disappointing to find the secondary education programs surveyed here lacked a focus on safety and safety education and teachers generally did not seek safety related training from business and industry sources.

Table 4

School Compliance with Safety Instruction: Materials Presented

	Compliance		
Safety Instruction	n[a]	f[b]	%
Students are provided / presented material on tool safety.	76	74	97.4
Students are provided / presented material on equipment safety.	76	74	97.4
Students are provided / presented material on electrical safety.	76	73	96.1
Students are provided / presented material on eye protection / safety.	76	72	94.7
Students are provided / presented material on fire safety.	76	71	93.4
Students are provided / presented material on animal handling safety.	76	63	82.9
Students are provided / presented material on chemical safety.	76	60	78.9
Students are provided / presented material on biohazard safety.	76	46	60.5
Students are provided / presented material on greenhouse safety.	76	36	47.4
Students receive basic first aid instruction.	76	18	23.7
Students receive CPR instruction.	77	3	3.9

[a]number responding to item; [b]frequency in compliance with procedure.

In most cases the responsibility of facility management fell upon the agriculture teachers, with little assistance from administrators to oversee or inspect an organized safety program. Very few of the programs had administrators or insurance agents who inspected the facilities, tools and equipment for safety concerns. The maintenance and monitoring of Material Safety Data Sheets (MSDS) was wholly inadequate.

In many facilities first aid supplies were not available or in poor condition. Basic administrative procedures such as posting a student cleanup schedule, evacuation procedures and emergency telephone numbers were largely ignored in the vast majority of programs.

Teachers do an adequate job of emphasizing the importance of safety by giving safety exams, demonstrating hand and power tool use and expecting students to demonstrate they have the skills to utilize these tools safely. Although most teachers did document safety instruction in lesson plans and kept these exams on file, there remains room for improvement in these areas.

A large number of teachers did not expect 100% mastery on safety exams before granting access to the laboratory. Additionally, it appears there is opportunity to more fully utilize, teaching resources such as field trips and resource people for emphasizing safety issues. Programs also showed a lack of grade book documentation concerning the re-teaching of safety material in the cases where students do not master the safety exam at the 100% level. There also appears opportunity for teachers to better utilize Computer Based Training (CBT) to emphasize safety.

Teachers can also do a better job when teaching most safety issues but particularly the areas of animal handling, chemical, biohazard and greenhouse safety appears to need more emphasis. Most teachers apparently failed to teach students basic first aid and CPR instruction. It should be noted that teachers could be unqualified or unprepared to deliver these types of training, but they could still utilize the various community and school resources and individuals to help bring these issues more emphasis in their curriculum.

Generally the researchers understood teachers were making a sincere effort to teach basic safety skills but unfortunately concluded that agriculture teachers failed to develop a total culture of safety in their programs. This may be due to the lack of a statewide, systematic procedure addressing the unique issues of safety in agricultural education programs.

Recommendations and Implications

Positive safety attitudes, beliefs and practices of agricultural science teachers are crucial for insuring students' educational opportunities are not hampered. This study identified and described demographics of teachers and facilities and the administrative and instructional procedures used in these programs.

1. An in-service program to help teachers create localized and personalized agriscience program safety procedures and guidelines should be developed and adopted for use statewide. This in-service program should include sections on safety philosophy, and detailed explanations and examples of thorough agricultural education safety programs. Safety education materials, forms, procedural checklists, etc. should be made available in electronic format so that teachers can edit them to suit their needs. Teachers should be provided with additional time and resources to properly develop and implement suggested procedures.
2. Teacher education programs should renew their commitment to meet the safety education needs of the 95% of secondary agriscience teachers who must lead students in a mechanics laboratory in their daily routine. Competence in the safe operation of agricultural mechanics laboratories remains a necessary component of a teacher education program.
3. As a means of improving teachers' awareness of the importance of developing a proper safety climate in their programs teacher preparation programs should place a much larger emphasis on planning safety programs and curriculum. This will ensure that entry-level teachers understand their role in creating and maintaining a positive safety climate.
4. Workshops should be organized and offered during the Professional Improvement Conference on safety education, curriculum and program development. Addressing these areas may have a positive affect on teacher attitudes and program emphasis on a proper safety culture. Attending will also show proaction in the event of litigation problem.
5. Existing safety materials and curriculum should be reviewed to determine relevance for the great variety of agricultural education programs in Texas. Safety materials and curriculum should be

developed and disseminated throughout the state in paper and electronic formats. Revised and newly developed materials will demonstrate to teachers the importance of safety at the state level.

6. Computer Based Training programs for safety instruction need to be developed and disseminated throughout the state. This can further develop a strong safety philosophy "on three dimensions – the cognitive, motivational, and attitudinal – (students) are believed to reap the benefits (Magney 1990, p. 55). Creswell and Martin (1993) found that computer-based instruction is an effective tool in delivery safety instruction, however it is rarely used as was further demonstrated by this study. This is perhaps due to the lack of teacher competence in using computer-based instructional technologies (Schlautman & Silleto, 1992). Further, teachers should be provided training on the benefits and use of CBT.
7. This and similar studies should be repeated annually throughout the state, as well as other states to continue to document progress and bring much needed attention to safety issues in agricultural education programs.

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Desktop Videoconferencing: an Effective Tool for Communication and Instructional Supervision?

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Abstract

The purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors in agricultural education. The study was guided by two research questions and three hypotheses and used two quasi-experimental research designs along with focus group interviews to test the hypotheses. Results indicated that desktop videoconferencing was an acceptable tool for communication and instructional supervision, but a lack of adequate technology resources in the secondary schools was determined to be a serious barrier to routine use. It was recommended that more reliable technology tools be sought to enhance communication and instructional supervision. High-speed interactive audio and video networks that use phone lines or fiber optic networks may provide a reliable option.

Introduction

Many authorities in the field of education feel strongly that student teaching is the most important part of any teacher education program (Richardson-Koehler, 1988; Zaborik, 1988). The student teaching experience is a time when the preservice teacher can actually perform the day-to-day tasks that are the responsibility of a teacher. This hands-on real-world experience is supported by Dewey's (1938) proposition that learning is not automatically transferable to conditions unlike those in which the learning took place.

A successful student teaching experience requires the student teacher, cooperating teacher, and university supervisor to work as a team (Hoover, O'shea & Carroll, 1988). Developing and maintaining communications among the parties is of great importance. The physical distance that separates the student teacher and the university supervisor may result in pedagogical difficulties, especially in the area of communication. Moore and Kearsley (1996) called this pedagogical distance that is created by physical separation "transactional distance." Moore and Kearsley noted that we overcome this transactional distance with instructional design and interaction procedures.

Desktop videoconferencing might be a useful tool to reduce the transactional distance between student teachers and their university supervisors. Relatedly, computer conferencing appears to have the potential to improve the level of student teachers' reflective thinking about their teaching performance and to assist in developing new methods of teaching (Harrington, 1992).

Research on various components of videoconferencing has become more advanced as interest in distance education continues to rise (Mason, 1995; Rapaport, 1991). Research on desktop videoconferencing has been conducted to assess its feasibility and to evaluate the quality and effectiveness of communication. Edmonds (1996) found that desktop videoconferencing could be successfully used to improve the quality of interaction between students and teachers and could improve the quality of learning. Veen et al. (1996) observed that students felt free to speak about feelings, attitudes, and social problems that they were facing during their student teaching experience while engaged in videoconferences. Warren et al. (1996) noted that videoconferencing offered opportunities for individual student teachers to share their experiences with others and to receive responses and communicate more frequently with their university supervisor.

Previous research involving desktop videoconferencing has been conducted on relatively small populations. More data are needed to adequately evaluate the usefulness of desktop videoconferencing technology (Dudt & Garrett, 1998; Veen et al., 1996). Can desktop videoconferencing be a useful tool for enhancing communication and instructional supervision of student teachers in agricultural education?

Purpose and Objectives

The primary purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors. The objectives of this study were to:

1. Describe demographic characteristics of the student teachers, cooperating teachers, and university supervisors involved in this study.

2. Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

The hypotheses of this study were as follows:

1. Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

2. There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

3. Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who received only on-site supervision.

Procedures

The population consisted of 17 student teachers, 17 cooperating teachers, and 5 university supervisors in agricultural education at one land-grant university in the spring semester of 1999. An additional university supervisor conducted two on-site supervisory visits. The sixth supervisor became involved after disagreements arose between the student teacher and the original supervisor. The sixth university supervisor was not added to the population of this study. The treatment group was purposefully selected based on the availability of sufficient computer equipment in the student teaching centers. The treatment group (n=9) received two on-site university supervisor visits and two desktop videoconferencing visits with their supervisor. Participants in the treatment group videotaped two lessons and sent them to their university supervisor. The tapes were reviewed by the university supervisor and discussed during the desktop videoconferences. The control group (n=8) received the traditional three on-site university supervisor visits and experienced no videoconferencing.

The study was classified as quasi-experimental. The nonequivalent control group design was used to compare attitudes toward desktop videoconferencing. The static group comparison design was used to compare the level of reflective thinking between treatment and control groups and to determine whether the treatment affected student teaching grades. To address the threats to internal validity commonly associated with these designs, demographic data were gathered from all participants and used to determine whether persons in the treatment and control groups were similar (Campbell and Stanley, 1963).

A Likert-type scale was used to measure participants' attitudes toward desktop videoconferencing and was given as a pre- and posttest. Another Likert-type instrument was used to measure the level of reflective thinking achieved by the student teacher and was administered only as a posttest. The instrument designed for attitudinal assessment was patterned after one used to study attitudes toward an interactive communications network (Miller, 1997). The instrument to evaluate the student teacher's level of reflective thinking was created by Germain Taggart and obtained from the book Promoting Reflective Thinking in Teachers: 44 Action Strategies (Taggart & Wilson, 1998).

According to Taggart and Wilson (1998) reflective thinking on the technical (lower) level occurs mainly from referencing past personal experiences to meet outcomes. Reflection focuses on behaviors, content, and skill when designing lessons. Reflective thinking on the contextual (mid) level looks at alternative practices for problem solving based on knowledge gained. Contextual reflective thinkers are concerned with student needs and with the analysis, clarification, and validation of principles when designing lessons. Reflective thinking on the dialectical (highest) level addresses not only student needs but also student moral, ethical, or socio-political issues. The dialectical reflector works toward attaining disciplined inquiry, individual autonomy, and self-understanding in the designing of lessons.

A panel of seven graduate students and three faculty members in Agricultural Education determined that the attitude instrument possessed content and face validity. The panel members were not otherwise involved in the study. The attitude instrument was then pilot tested with 11 students enrolled in a junior-level Foundations of Agricultural Education course, seven graduate students, and three faculty members in Agricultural Education. Cronbach's alpha was used to assess the internal consistency of the attitude instrument. The resulting coefficient was .84.

Construct validity for the reflective thinking instrument was based upon the instrument's correspondence to a reflective thinking model that was created to explain three levels of reflective thinking. A reliability analysis was performed on the reflective thinking instrument using data provided by the student teachers that were studied. The Cronbach's alpha coefficient was .78.

All data were analyzed with the SPSS for windows personal computer program. Frequencies, percentages, means, standard deviations, and appropriate correlational statistics were used for descriptions. The rules of thumb established by Ary, Jacobs and Razavieh (1996) were used to interpret relationships between variables. The chi-square and t-test statistics were used to test the hypotheses.

Students participated in a focus group interview at the end of their student teaching semester. The focus group interviews were facilitated by a person who was not otherwise involved in the study or with the student teaching program. Kruger (1994, p. 3) states that "the focus group allows for group interaction and greater insight into why certain opinions are held." The purpose of the focus group was to create a triangulation of data to see if the qualitative data were consistent with the quantitative data. The treatment group was asked questions regarding their experiences with and opinions of desktop videoconferencing. The control group was asked whether they believed that desktop videoconferencing provided communications advantages and if they would have liked to use desktop videoconferencing while student teaching. Two students were unable to participate in the focus group interviews because they were out of state performing student teaching activities during the time that the questions were administered.

Results

Objective One: Describe demographic characteristics of the student teachers, cooperating teachers and university supervisors involved in this study.

Of the nine student teachers in the treatment group, five (55.6%) were male, and four (44.4%) were female. Members of the treatment group were on average 22.7 years of age with a standard deviation of 1.4. Their mean GPA was 3.33 with a standard deviation of .38. Regarding the control group, five (62.5%) were male, and three (37.5%) were female. Members of the control group were on average 24.5 years old with a standard deviation of 5.4. Their mean GPA was 3.27 with a standard deviation of .41. There were no statistically significant associations between student teacher group and the demographic characteristics reported here.

All of the cooperating teachers in the treatment group were male. This group averaged 17.4 years of teaching experience with a standard deviation of 7.9. Only 22.2% of teachers in this group had participated in a workshop on supervising student teachers. Seven out of eight cooperating teachers in the control group were male. Teachers in this group had on average taught for 14 years with a standard deviation of 5.9. Three (37.5%) of the teachers in the control group had participated in a workshop on supervising student teachers. There were no statistically significant associations between cooperating teacher group and the demographic characteristics reported here.

All five university supervisors were male. The university supervisors ranged in age from 32 to 63 years with a mean of 42 and a standard deviation of 13. The average number of years of experience teaching secondary agriculture education was 5.2 with a standard deviation of 2.1.

The average number of years teaching postsecondary agricultural education was 11.8 with a standard deviation of 13.

Objective Two: Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

At the time of the pretest, the majority (66.6%) of student teachers in the treatment group either disagreed or were undecided that the use of desktop videoconferencing could enhance communication and instructional supervision. The remaining 33.3% agreed that desktop videoconferencing could be used as a tool to enhance communication and instructional supervision. Half (50%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The remaining 50% agreed with the use of the tool to enhance communication and instructional supervision. The average score for the treatment group was 3.03 with a standard deviation of .80. The average score of the control group was 3.46 with a standard deviation of .65 (Table 1).

At the time of the posttest, the majority (75%) of the student teachers in the treatment group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. In contrast, less than half (42.9%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The average score for the treatment group was 2.97 with a standard deviation of .70. The average score of the control group was 3.12 with a standard deviation of .94 (Table 1).

A coding error on the pretest made it impossible to distinguish the treatment and control groups for the cooperating teachers. Pretest scores from cooperating teachers showed that the majority (88.6%) were in favor of desktop videoconferencing being used as a tool to enhance communication and instructional supervision. The remaining 13.4% of teachers either disagreed or were undecided about the use of the tool to enhance communication and instructional supervision. The average pretest score was 3.83 with a standard deviation of .68. Regarding the posttest, most (85.7%) of the cooperating teachers in the treatment group agreed or strongly agreed that desktop videoconferencing could be used to enhance communication and instructional supervision whereas 75% of those in the control group expressed the same level of agreement. The mean score for the treatment group was 3.95 with a standard deviation of .59. The mean score for the control group was 3.56 with a standard deviation of 1.11 (Table 1).

Four out of the five university supervisors participated in desktop videoconferencing. Because of the small sample size, university supervisors were not divided between treatment and control groups. Pretest scores for university supervisors showed that 20% (n=1) of the university supervisors were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision. The remaining 80% (n=4) agreed that desktop videoconferencing could be a useful tool to enhance communication and instructional supervision. Posttest scores placed university supervisors' level of agreement into the same categories as the pretest scores. University supervisors reported slightly lower mean attitude scores on the posttest.

Table 1. Attitudes toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

Attitude	Student Teachers								Cooperating Teachers						University Supervisors			
	Pretest				Posttest						Posttest							
	Treatment		Control		Treatment		Control		Pretest		Treatment		Control		Pretest		Posttest	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Strongly Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	12.5	0	0.0	0	0.0
Disagree	2	22.2	1	12.5	2	25.0	2	28.6	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0
Undecided	4	44.4	3	37.5	4	50.0	1	14.3	1	6.7	1	14.3	1	12.5	1	20.0	1	20.0
Agree	3	33.3	4	50.0	2	25.0	4	57.1	11	75.3	5	71.4	6	75	4	80.0	4	80.0
Strongly Agree	0	0.0	0	0.0	0	0.0	0	0.0	2	13.3	1	14.3	0	0.0	0	0.0	0	0.0
Mean [a]	3.03		3.46		2.97		3.12		3.83		3.95		3.56		3.80		3.69	
Standard Deviation	.80		.65		.70		.94		.68		.59		1.11		.25		.49	

[a] 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Focus Group Interview Results

Treatment

Seven out of the nine students in the treatment group successfully installed the Quickcam cameras and Microsoft NetMeeting. Three of the cameras had to be installed outside of the agricultural education classroom. One camera was installed in the school library, one in a connecting classroom designated for computer aided drafting, and one was installed at the student teacher's home. Students found many difficulties with the installation of NetMeeting because of the lack of training and the fact that many schools locked classroom computers from various chat and electronic mail programs. Many of the schools' computer technicians had to unlock the block on the computers before the installations could be accepted.

Seven out of the eight participants in the focus group were satisfied with two on-site university supervisory visits. Student teachers did note that they would feel more comfortable with three on-site visits instead of two on-site visits and two videoconferencing visits. Students gave the following comments:

> "I would like to say that I got more out of personal visits than I did trying to do a videoconference."

> "Personal visits were better than videoconferencing, either mine didn't work or the one here on campus didn't work."

> "The technological difficulties and the time it took to play with the cameras and trying to get them to work really created more problems than it was worth."

Students in the treatment group were asked if desktop videoconferencing should be used in the future for other student teachers. Student teachers in the treatment group gave the following comments:

> "Yes, it should be used but all of the bugs need to be worked out."

> "I feel that the technology has a long way to come before it can be beneficial to us."

> "If you can get the technology to work and the compatibility problems fixed, then it would be a useful tool."

> "If you make it accessible with more schools and computers and if you have some patience it works out."

> "Yes I do believe that is would be beneficial, without doing it we are never going to advance."

Students were asked about the strengths and weaknesses of videoconferencing. Many of the students noted that they wanted to be asked instead of told to participate in the videoconferencing. Additionally, some felt that university supervisors were trying to escape an on-site supervisory visit. Other weaknesses concerned the technology problems. Many of the schools had slow and overloaded servers. Concerning the strengths of videoconferencing the following comments were made:

> "It had its strengths of allowing us to communicate back and forth. We could share ideas and experiences that others might have had while student teaching."

> "It keeps you connected...learning to use that type of technology is good."

> "I think it should be integrated and obviously this is a starting point."

Student teachers were asked if they had conferences with other student teachers during the twelve-week period. Five of the eight participants in the interview said that they participated in conferences with each other during the twelve-week student teaching experience. Student teachers were asked if they had any additional comments about desktop videoconferencing. More responses concerning the technological difficulties and the equipment problems emerged. One student said that he had great success with the videoconferencing.

> "Videoconferencing was good enough to replace a visit with my university supervisor, two visits were plenty for me. I think the strengths outweigh the weaknesses. My university supervisor and I did some sharing of files and did some things on the Internet together, so I enjoyed it personally."

Other students did not feel this type of impact with desktop videoconferencing, but the majority agreed that it should be used with future student teachers if the technological difficulties could be worked out. Students also pointed out that better training with the equipment is needed as well as more planning before student teachers go to their student teaching centers.

Control

The first question for the control group related to whether or not they thought that the student teachers in the treatment group had better communications with fellow student teachers and university supervisors. Three out of the six participants felt that the treatment group had somewhat of an advantage. The remaining three participants did not see any advantage. The following comments arose.

> "Yeah, I think that they probably did...I think that it would have been a highly useful tool to talk with the other students...I think that they had an advantage to get things communicated."

> "In some aspects...they would have a chance to send their messages faster or right on the spot and not have to think about it and dwell on it."

> "I don't think that there were any big advantages having it...to me it seems like it takes a lot more time trying to get on to the system...so I don't think there was an advantage."

Students were asked next if they would have liked to have used desktop videoconferencing during their student teaching experience. All six of the participants said no. Students reflected on timing conflicts, and all stated that they did not have the time while student teaching for desktop videoconferencing. Student teachers also mentioned the need for better training on the equipment. All student teachers in the control group heard about the problems and frustrations that students in the treatment group experienced.

University supervisor interviews

Interviews after the student teaching period with university supervisors showed that four out of five of the supervisors felt that two desktop videoconferences could successfully replace one on-site supervisory visit. Most (n=4) university supervisors did point out that at least two on-site supervisory visits were needed during the student teaching experience. One visit during the first period of student teaching and the second near the end of the student teaching experience were considered to be a necessity. University supervisors felt that all visits should not occur through desktop videoconferencing.

University supervisors described conversations through videoconferencing visits as being very similar to conversations that took place during on-site visits. Topics that were discussed over desktop videoconferencing included reflection on the lesson that was viewed by the university supervisors from a videotape sent by the student teachers, current agricultural education job opportunities, state teacher licensing procedures, FFA activities, and various student teaching assignments. University supervisors did note that they missed interaction between the student teacher and his or her students by only watching the videotape rather than being at the site in person.

Videotape quality varied with each student teacher in the treatment group. Some cooperating teachers operated the camera, resulting in a good-quality video. Other videos were made from a stationary position in the classroom. As a result the entire classroom and some classroom interaction was not recorded. Sound quality was often low because the microphone was too far away from the person speaking.

Hypothesis One: Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

Student teachers and university supervisors were less positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing. Cooperating teachers who experienced desktop videoconferencing were slightly more positive than those who did not (Table 1). The difference was not great enough, however, to be statistically significant ($t = -.83$, 13df, $p > .05$).

Hypothesis one was not supported by the data.

Hypothesis Two: There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

Table 2 shows the grades achieved by the student teachers. Most student teachers (94.1%, n=16) earned an A. One (5.9%) student teacher earned an A-. A chi-square analysis was used to determine if treatment and control groups' grades differed significantly. The results show no significant difference in grades between the treatment and control groups. Hypothesis two was supported by the data.

Table 2. Student teaching grades.

	Treatment		Control	
Grade	f	%	f	%
A-	0	0.0	1	12.5
A	9	100.0	7	87.5

Note. phi = .265, $p > .05$

Hypothesis Three: Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who only received on-site supervision.

Table 3 compares the reflective thinking levels achieved by student teachers in the treatment and control groups. Reflective thinking levels were interpreted as follows: <75 = Technical level; 75 to 104 = Contextual level; 105 to 120 = Dialectical level. Students who received desktop videoconferencing as a tool for supervision (n=8) reported a mean of 104.3 with a SD of 9.25. Students who did not receive desktop videoconferencing (n=7) reported a mean of 105.7 with a SD of 4.31. Although treatment and control group scores were in different categories, the difference between their reflective thinking levels was not of statistical or practical significance. Hypothesis three was not supported by the data.

Table 3. Student teachers' reflective thinking levels

	Technical		Contextual		Dialectical			
Group	f	%	f	%	f	%	M	SD
Treatment	0	0.0	4	50.0	4	50.0	104.3	9.25
Control	0	0.0	3	42.8	4	57.2	105.7	4.31

Note: $t = .383$, $p > .05$

Conclusions

- Desktop videoconferencing is an acceptable tool for communication and instructional supervision.
- A lack of adequate technology resources in secondary agricultural education programs is a serious barrier to using desktop videoconferencing with all student teachers.
- Overall, students teachers were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.
- Professors and cooperating teachers, including cooperating teachers who were not in the treatment group, held positive attitudes toward desktop videoconferencing as a tool to enhance communication and instructional supervision.
- Levels of reflective thinking and grades achieved were neither positively nor negatively affected by the desktop videoconferencing treatment.

Recommendations

- Findings of this study should be shared with university supervisors of agricultural instruction to serve as a benchmark of potential pros and cons of desktop videoconferencing as a tool to enhance communication and instructional supervision during the student teaching experience.
- More investigation is needed to evaluate computer equipment, server capabilities, and connection speed at secondary sites so videoconferencing hardware and software can be installed properly.
- More reliable technology tools should be sought to enhance communication and instructional supervision. High-speed interactive audio and video networks that use phone lines or fiber optic networks may provide a reliable option.
- This study should be replicated to analyze the capabilities of desktop videoconferencing in other states and to evaluate attitudes towards the technology from other student teaching populations in other teaching majors.

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Escalation Model For Instructional Supervisors In Agricultural Education

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Abstract

The principal purpose of this study was to identify supervision models that are potentially useful to supervisors of agricultural instruction. In this article, the models that were selected served as the basis for creating the Escalation Model for instructional supervisors in agricultural education. The Escalation Model is divided into three levels that encompass different models of supervision. The models of supervision are placed on a continuum of structure, reward, and risk. As the supervisor matures in the supervisory process, it is proposed that the model of supervision used should change. With the change in supervisory models, the supervisor will progress in an upward direction on the continuum and facilitate more teacher-directed models of supervision. With teacher-directed models of supervision, the teacher and supervisor could experience greater reward from the supervisory process.

Introduction

"Instructional supervision is the function in educational systems that draws together the discrete elements of instructional effectiveness into a whole educational action" (Glickman, Gordon, & Ross-Gordon, 1995, p. 15). Supervision, teaching, and learning are major components of this educational system (Montgomery, 1999). Without these components the educational system may not be effective.

Each individual student who applies knowledge that is constructive, cumulative, self-organized, goal oriented, situated, and individually different (Montgomery, 1999) achieves effective learning. Effective learning should be the teacher's primary focus in education. If students do not learn, then educators have not successfully fulfilled their responsibility to the students. Therefore, students may not be adequately achieving educational goals due teaching techniques. Glickman, Gordon, and Ross-Gordon (2001) suggest that the blame for lack of student learning will be placed on the teachers and their teaching techniques.

"Effective teaching is occurring where the majority, preferably all the pupils, learn most of what the teacher intended. The pupils want to learn and do not have to be made to" (Montgomery, 1999, p. 126). This is a very difficult task to accomplish, and for some teachers it may take several years, if it happens at all. Montgomery's (1999) research has shown that teachers' lack grounding in relevant professional teaching theory and become susceptible to fashions and fads in teaching. Therefore, the teachers are unable to develop an effective system for teaching. Cogan (1973) concluded "the profound underestimation of the difficulties teachers face in learning how to teach and in improving their teaching on the job is at the root of the major problems in the preservice and inservice education of teachers" (p. 15).

Hersey & Blanchard (1972) affirmed that individual performance within an organization is often substantiated by effective supervisory leadership practices. Since education systems are referred to as organizations, individual teachers may be more satisfied with their jobs if supervisors are providing effective leadership and support to teachers. If so, that satisfaction from teachers will stand out. Moreover, students may become aspired to learn more.

Supervision could be very important to the teachers' overall satisfaction. Glickman, Gordon, and Ross-Gordon (2001) describe effective supervision as the glue that holds individual teachers' needs and school goals together. Glickman, Gordon, and Ross-Gordon (2001) go on to say "glue, if functioning properly, cannot be seen" (p. 9). Likewise, when supervision is functioning properly, it also goes unnoticed. But when the glue quits sticking, as in the case of inadequate supervision, the object (the school system) will collapse.

Supervision is a chance to promote teacher efficiency, abstract thought, and a reflection on the teacher's own instruction (Glickman, Gordon, & Ross-Gordon, 1995). If the supervisor lacks adequate knowledge of supervision and does not know how to meet the needs of the teacher, then there may be an unproductive working relationship established (Acheson & Gall, 1980). The teacher could spend time being upset with the supervisor and might not devote sufficient effort toward teaching students. More importantly, the student's desire, ability, and level of learning may be affected (Beach and Reinhartz, 2000). When the supervisor cannot meet the needs of the teacher, the entire teaching experience may not be as effective as it could have been (Sergiovanni & Starratt, 1988).

The need to study supervision has not yet been fulfilled, as indicated by a scarcity of agricultural education scholarship related to supervision. Out of 774 articles published in the Journal of Agricultural Education between 1976 and 2000, only three directly focused on the supervision of teaching and one on the satisfaction of a supervisory process. Martin and Howell, in 1983, wrote about supervisory techniques used by principals and the related implications to the success of beginning teachers. Barrick, in 1985, focused his article on the current and expected roles of agriculture supervisors. In 1986, Martin and Yoder studied one supervision technique, clinical supervision, and how the technique should be practiced. The final article, written by Borne and Moss in 1990, focused on the satisfaction of student teachers, cooperating teachers, and university supervisors with agricultural education student teaching and the supervisory process. One of the undertakings of teacher educators in agriculture, as suggested by Hedges (1989), is coaching teachers to enhance their performance in the classroom. If this is so, more scholarly work in the area of supervision is needed.

Purpose and Objectives

The principal purpose of this article was to identify supervision models that are potentially useful to supervisors of agricultural instruction. The specific objectives are:

1. Identify and explain models of instructional supervision that may be useful for supervision of agricultural instruction.
2. Present a model for supervisors of agricultural instruction to use in making decisions relative to the application of selected supervision models.

Methods

A library search was performed to obtain information on a variety of models and techniques of supervision. Educational Resources Information Center (ERIC) and Psychological Abstracts (PsychLit) were the databases used to identify articles focusing on instructional supervision. Articles were gathered from the following sources: Association for Supervision and Curriculum Development Yearbook, Journal of Agricultural Education, Educational Researcher, Educational Leadership, Journal of Curriculum and Supervision, Journal of Teacher Education, The Journal of Higher Education, Journal of Staff Development, Viewpoints, and Principal. Additionally, the catalog of a Midwestern land grant university library was searched for all holdings related to instructional supervision. This search was used to locate books and other sources of information not indexed in ERIC and PsychLit.

The analysis of all this information progressed in two phases. The initial phase involved selecting models and techniques of supervision and then focusing on how they could be used by university-based teacher supervisors. Regarding selection criteria, models chosen were those that 1) fit along a continuum of potential growth for the supervisor, 2) provided specific explanations of how the models could be used, 3) had a record of successful application, and 4) reflected different styles of supervision to use when supervising agricultural instruction. Agricultural education is different from several other subject areas. Many subject areas have classroom and laboratory structures to supervise but most of the time not a third component. Agricultural education teachers typically include individualized classroom instruction, SAE participation, and FFA activities into their curriculum. Therefore, agricultural education is unique and supervisory models that could aide in the agricultural education supervision process were used.

The second phase of the analysis focused on which models and techniques could be used most effectively in agricultural education. According to Newcomb, McCracken, and Warmbrod (1993), the objectives of instruction in agriculture are to 1) develop vocational and practical arts interests, knowledge, and skills; 2) provide exploration of and orientation to occupations requiring knowledge and skills in agriculture; 3) develop knowledge and skill for occupational competence; and 4) prepare for more advanced study of agriculture. Furthermore, the extent of teaching skills and knowledge used by agricultural education teachers requires the supervisor to be flexible enough to accommodate such a variety. Supervision models that were selected can be used in an individualized laboratory, classroom, or instructional setting.

Findings

Objective 1. Identify and explain models of instructional supervision that may be useful for supervision of agricultural instruction.

Although several models and techniques of instructional supervision are mentioned in the literature, this article is based on those that accommodate a professional maturation process for the supervisor. Hersey and Blanchard's (1972) leadership model and Glickman, Gordon, and Ross-Gordon's (2001) research was influential in the decision to use the developmental approach. Glickman, Gordon, and Ross- Gordon (2001) emphasized that teachers are not all at the same level of professional maturity. Likewise, supervisors, as adult learners, also possess varying levels of professional maturity (Knowles, 1978).

The models were analyzed and placed into three growth levels for supervisors to use in deciding which model would be most appropriate for a given situation. These growth levels are apprentice, experienced, and professional. The supervision models can be placed along a continuum representing the level of structure required by the model, the potential reward/risk for using the model, and the level of maturity of the model required by the supervisor to use the model.

The level of structure refers to the specified steps that each type of supervisory model requires. The more specific procedures a model requires, the more structured it is. Potential reward is described as an "incentive" for both the supervisor and teacher. Supervisors can be less directive with their supervisory practices and provide an opportunity for the teacher to gain more self-control that attains job satisfaction (Hersey & Blanchard, 1972). But there are potential risks involved for the supervisor when supervision is teacher driven and the structure of supervision diminishes. Highly achievement-motivated individuals tend to take more risks that in turn can produce greater results (Hersey & Blanchard, 1972). A supervisor that is more conservative tends to feel secure with structure and feels that there is little danger of any mistake being made. Therefore, if there is rewards to be gained in this model, there will be potential risks to achieving those rewards.

Supervisor maturity is also a feature in the model. The low, median, and high maturity concepts are linked to Hersey & Blanchard's (1972) leadership theory. They define maturity as "achievement-motivation, the willingness and ability to take responsibility, and task relevant education and experience of an individual or a group"(p.134). Low maturity is a supervisor who is new to supervision or a model of supervision and must receive structure in his or her supervisory work. Median maturity is a supervisor who has had some experience with supervision and some workshops or training courses, etc. but still needs some structure in the supervisory process. High maturity is a supervisor who has had a great deal of experience in supervision, advanced supervisory education, and can feel comfortable with teacher driven types of supervision.

Apprentice Level

The apprentice level introduces a starting point for supervisors. Apprentice refers to the newcomer, rookie, or amateur stage of the supervisor (Kay et al., 1976). This person would be new to instructional supervision and would require more structure on how to conduct supervisory visits and the supervisory process. The clinical and collaborative supervision approaches are recommended for this level and were chosen due to their complete step-by-step processes.

Apprentice-Clinical Supervision

Clinical supervision, the first model of supervision recommended for the apprentice level, is a form of inquiry designed to encourage teachers to reflect on and analyze their own teaching and to develop and test hypotheses about what is effective and why (Cook, 1996). Goldhammer (1969) and Cogan (1973) identified five major steps in clinical supervision: planning conference, classroom observation/data collection, analysis/strategy, supervision conference, and postconference analysis. There are several procedures to follow within the five major steps that can help direct the supervisor.

The planning conference is designed to inform the supervisor of the objectives for the lesson. The teacher should have prepared a detailed lesson plan for the supervisor to critique and on which to give suggestions (Acheson & Gall, 1980).

During the classroom observation/data collection step the supervisor observes the teacher teaching the lesson that was outlined in his/her lesson plan. The supervisor should use his/her observation instrument to collect data on the lesson being taught (Acheson & Gall, 1980). This procedure will provide written information to be given to the teacher in the postobservation conference.

The analysis and strategy stage is the core of clinical supervision because the supervisor conceptualizes what he/she observed in the classroom and converts the analysis into readable data for the teacher (Goldhammer, 1969; Cogan, 1973). The teacher then has a representation of how the supervisor perceived the lesson.

The supervision conference is designed for the supervisor to dialogue with the teacher on the lesson observed (Goldhammer, 1969; Cogan, 1973). This is a time for the teacher to give input on the lesson. In addition, the supervisor and teacher work together to establish goals to be met at the next observation date.

The postconference analysis is primarily for the supervisor. He or she must analyze if the best supervisory practices were used with the teacher. This analysis provides a reflection exercise to help the supervisor on improving the next supervisory conference (Goldhammer, 1969; Cogan, 1973).

Apprentice-Conceptual Model

The second model recommended for the apprentice level is the conceptual model. This model emphasizes the need for supervisors to familiarize themselves with influences that may affect the teaching process. The conceptual model is supported by the organizational theory emphasizing that individuals are unified by a common set of ethics and work together within a system of structure to accomplish specific goals and objectives (Beach & Reinhartz, 1989). The key for the supervisor using the conceptual model is the system of structure.

The conceptual model is based on clinical and collaborative supervision. In addition to the supervisory steps of clinical supervision and the collaboration established by the supervisor and teacher, the supervisor considers other factors that may affect teaching. Edmeirer and Nicklaus's (1999) conceptual model outlines organizational factors (work load, classroom climate, support of colleagues, decision making, role conflict, and support from supervisor via supervision) and personal factors (life stage, teaching assignment, interpersonal, intrapersonal, conceptual level, experience in education, and knowledge of subject) that influence teacher commitment and trust in the teaching system as well as how these factors directly reflect on the performance quality of the teacher. A supervisor should understand how factors that a teacher can and cannot control might affect their quality of teaching.

The supervisor and teacher set certain benchmarks based on personal and organizational factors that influence the teacher's performance. If possible changes in organizational and personal factors should be made, and the teacher's improvements toward the benchmarks will be evaluated in each supervisory visit. For example, if the teacher is preoccupied with the notion that other teachers do not like him or her, the teacher's teaching effectiveness may suffer. The supervisor should help the teacher with these feelings whether they are warranted or not, because in the mind of the teacher they are reality. This type of supervision builds on a relationship and is initially used to develop trust between the supervisor and the teacher.

After conducting structured supervisory visits, developing a better understanding of supervision techniques in experienced level, and assessing one's maturity level, the supervisor may be ready to move to the experienced level.

Experienced Level

The experienced level introduces models that are appropriate for an intermediate level of supervisor maturity. This level is made possible by previous experience and starts a self-discovery process related to different supervision styles. In the apprentice level, the supervisor was primarily focused on the process of supervision, but in the experienced level the supervisor begins to broaden his/her knowledge base about different supervisory practices.

The experienced level allows the supervisor more freedom in the style of supervision. The supervisor begins to reflect on supervision practices and allows more teacher involvement. The supervisor develops a deeper understanding of supervision based on his/her experiences, advanced education, and reflection on his/her own supervisory practices. This level still requires some guidance from the models themselves, but the rigidity of the structure begins to diminish. Two models recommended for the experienced level are developmental and contextual supervision.

Experienced-Developmental Supervision

Glickman, Gordon, and Ross-Gordon (2001) explain developmental supervision as "the match of initial supervisory approach with the teacher or group's developmental levels, expertise, and commitment" (p. 197). The supervisor in the developmental approach gives three types of assistance: directive, collaborative, and nondirective. Teachers who have low conceptual thinking and low commitment to their teaching will be matched with directive supervision. Teachers at earlier stages of development have problems making decisions and defining problems, and they have few ways of responding to problems. Directive supervision places the supervisor, as the expert and the one in charge of writing the goals for the teacher, saying the teacher will achieve these goals, and stating when the teacher should achieve the goals.

Teachers at moderate levels of abstract thinking, expertise, and commitment are best matched with the collaborative supervisory approach (Glickman, Gordon, & Ross-Gordon, 2001). In this approach, the supervisor and teacher establish goals to be achieved, how they will be achieved, and when the achievement should be noticed as a team.

The teachers who think abstractly and are highly committed to teaching are best matched with the nondirective approach (Glickman, Gordon, & Ross-Gordon, 2001). The nondirective approach allows the teacher to be in control of how and when the goals will be achieved. The supervisor is still involved, but takes a more passive role in the supervisory process. Glickman, Gordon, and Ross-Gordon (2001) identify the behaviors of the supervisor in this role as listening, reflecting, clarifying, encouraging, and problem solving.

Experienced-Contextual Supervision

The second model of supervision recommended for the experienced level is contextual supervision. In this approach, supervisory styles are matched to the teacher's development or readiness level to perform a particular teaching task (Ralph, 1998). The readiness levels are a function of the teacher's confidence and competence. Competence is the extent of the teacher's knowledge, skill, and ability to perform a certain task. Confidence is the degree of self-assurance, willingness, motivation, interest, or enthusiasm to become engaged in the task (Ralph, 1998). The contextual model of supervision requires that the supervisor have the ability to adjust and provide different leadership styles to match the teacher's developmental level of teaching.

The contextual model provides four quadrants for the supervisor to determine the readiness level and confidence of the teacher. The first quadrant is labeled high confidence and low competence (Ralph, 1998). The teacher is energetic toward teaching but is not completely proficient with the material that he/she is teaching. The supervisor establishes low support and high task for the teacher. Ralph (1998) refers to support as the amount of encouragement/motivation given to the teacher. Task is referred to as the amount of guidance that is provided in subject matter areas.

The second quadrant of the contextual model is labeled low confidence and low competence (Ralph, 1998). The teacher is not energetic about teaching and not proficient in a particular subject area. The supervisor provides the teacher with high support and high task.

The third quadrant of the contextual model is labeled low confidence and high competence (Ralph, 1998). In this quadrant, the teacher is not confident in his/her teaching abilities but is knowledgeable about the subject he/she is teaching. The supervisor would provide high support and low task to the teacher.

The final quadrant of the contextual model is labeled high confidence and high competence (Ralph, 1998). The teacher is enthusiastic about teaching and is proficient in the subject area. The supervisor would then provide feedback to the teacher if they had any immediate concerns.

The experienced level is recommended for supervisors who have been supervising for at least 3 years, are receiving advanced education in supervision, and are feeling comfortable with their abilities as a supervisor. This level should be accompanied by more reflection by the supervisor on the results that are meaningful to the teacher. The experienced level, as stated, is a growth process that the supervisor must go through to develop the supervisory skills necessary for the professional level.

Professional Level

The professional level offers the supervisor a more reflective role with the teacher. The professional level assumes that, in addition to experience, the supervisor has acquired specialized knowledge of the model recommended for the professional level, thorough academic preparation in supervision, and obtained a high level of maturity. The professional level would best suit a teacher who is comfortable in the teaching process. It would also benefit a supervisor who is ready for a more flexible, supervising role.

Professional-Differentiated Supervision

The supervisory model recommended for professional level, differentiated supervision, allows the teacher to choose one of four supervisory options. Differentiated supervision is particularly teacher driven and allows the supervisor to become more of a mentor to the teacher. Additionally, the supervisor can focus his/her efforts where they are needed most (Glatthorn, 1997).

Glatthorn (1997) suggests four options for differentiated supervision: intensive development (a special approach to clinical supervision), cooperative professional development, self-directed, and administrative monitoring. The teacher chooses one of the supervisory options, and then the supervisor and teacher focus on that area.

Glatthorn (1997) suggests that intensive development, the first option of the differentiated supervisory model, is a process requiring many observations conducted by the supervisor that focuses on learning outcomes instead of teaching methods. Intensive development should be used with a small number of teachers who are experiencing difficulty.

Intensive development, designed by Glatthorn (1997), includes eight components that involve five or more cycles and multiple observations. The first component is the taking stock conference. This conference is held anytime the supervisor and teacher want to discuss their professional relationship or to reflect on what has been accomplished.

The second (preobservation), third (diagnostic observation), fourth (analysis of diagnostic observation), and fifth (diagnostic debriefing) components of the intensive development option are equivalent to the planning conference, classroom observation, analysis/strategy, and supervision conference of the clinical supervision model.

The sixth component, coaching session, of the intensive development option provides an opportunity for the supervisor and teacher to select one skill from the diagnostic process to be focused on.

The seventh component, focused observation, focuses on one skill, using a form intended to assemble information about the teacher's use of that skill.

The focused debriefing conference, the eighth component, allows the supervisor and teacher to review and analyze the results of the focused observation.

The second option, cooperative professional development, is a mutually respectful process in which a small group of teachers agree to work together to develop their own professional growth (Glatthorn, 1997). The teacher would be part of a two-or-three teacher team who would go through the mentoring process together. The teachers would observe each other's class and give feedback on each other's teaching. This type of supervision is less time consuming for the supervisor because the teachers are conducting the supervisory process with the supervisor serving as a mediator. Cooperative professional development can be used with more experienced teachers and supervisors who are seeking collegiality (Showers & Joyce, 1996). This could provide a beneficial mentoring experience for teachers.

The third suggested option of the differentiated supervisory model is self-directed. Beach and Reinhartz's (2000) research states that self-directed supervision enables the individual teacher to work independently on professional growth and allows the supervisor to have a more relaxed supervisory role. In this case, the teacher would develop and carry out individualized plans for professional growth with the supervisor serving as a resource. This technique specifically is for the teacher who prefers to work alone, yet seeks the aid of the supervisor as a mentor (Glatthorn, 1997). Glatthorn (1997) and Beach and Reinhartz (2000) state the teacher would self-evaluate his/her teaching using videotape, inventories, reflective journals, or portfolios to critique the teaching procedure. The supervisor does not need to evaluate the lesson, but through individual conferences the supervisor could provide feedback on improving the instruction, if the teacher so desires.

The final option available to teachers in the differentiated supervisory model is administrative monitoring. Glatthorn (1997) defines administrative monitoring as a process by which the supervisor monitors the teacher's classroom with brief, unannounced visits. This option is used to monitor the activity in the classroom and enables the supervisor to be aware of any problems the teacher is having.

Objective 2. Develop a model for supervisors of agricultural instruction to use in making decisions relative to the application of selected supervision models.

Based on the review and analysis of literature, a model for supervisors was conceptualized to aid in their growth process (see Figure 1). The supervision models can be placed along a continuum representing the level of structure required by the model, the potential reward/risk for using the model, and the level of maturity of the model required by the supervisor to use the model.

The Escalation Model is a unique representation of choices available to supervisors of agricultural instruction. The Escalation Model, represented by the reward/risk spectrum, outlines the three levels. Once again, reward refers to an "incentive" and risk is referred to as a "chance" taken by supervisors for more self-directed forms of supervision.
The left side of the spectrum begins with the apprentice level. The apprentice supervisor is more administrative, directive, and structured in the supervision process. The supervisor at this level may typically focus on completion and success of the supervision process. The models in this

level are also used to familiarize the supervisor with basic supervisory practices. The apprentice level may not allow the teacher as much freedom as the experienced and professional levels, but the apprentice level allows the supervisor to develop self-confidence in his/her supervisory role. The apprentice level should primarily be used for the supervisor who is new to supervision, needs structure on conducting a supervisory visit, and needs assistance on supervisory techniques.

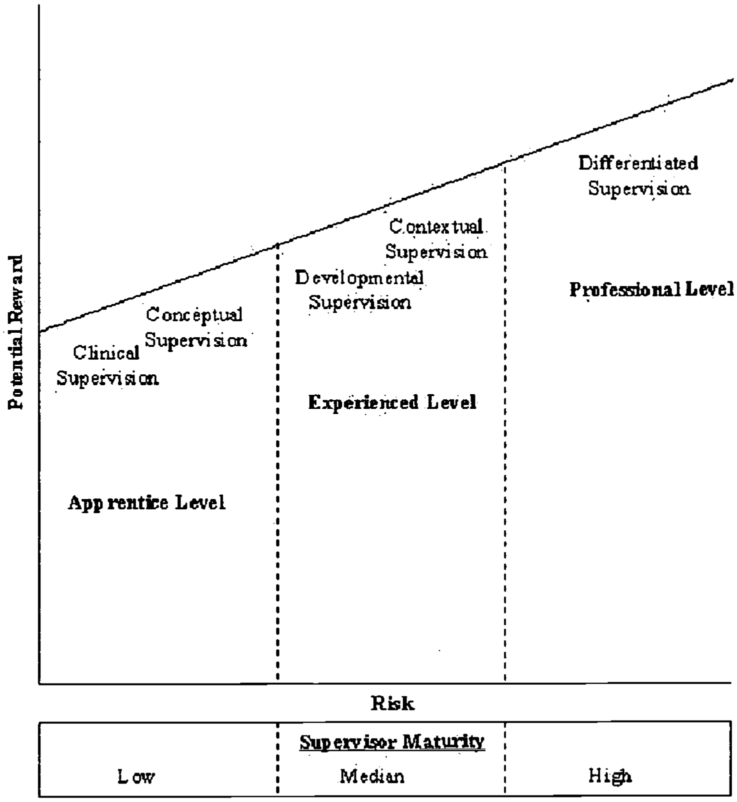

Figure 1: Escalation Model for Instructional Supervisors

As a supervisor continues to move to the right on the spectrum, from the apprentice to the experienced level, he/she should start to mature, gain more confidence, and develop more knowledge of supervision. The supervisor is growing professionally in the supervision process with teachers. With a combination of knowledge and supervisory skills gained in the apprentice level, the experienced supervisor could show a substantial amount of maturity and reflection. However, the supervisor should be reflecting and growing throughout each supervisory model that is used. With reflection being an ongoing process, the supervisor should start to witness more rewards or satisfaction with teachers and their progress with supervision. These two models are for supervisors who have experience conducting supervisory visits but still need some structure for supervising teachers. The models also provide implications for some advanced training on supervision.

The final level of the spectrum, the professional level, should be the most rewarding to both the supervisor and teacher. The professional level is considered the most powerful level in the model. The supervisor at this level must be at high maturity levels with extensive experience and knowledge about supervision. Since the professional level includes a combination of models from the apprentice and experienced level to enrich the supervision process, a supervisor must be confident that he/she can guide the teacher accordingly. If reflection is ongoing, the professional level should benefit both teacher and supervisor. It encourages the supervision process to be teacher driven.

A supervisor could use a supervisory model within the Escalation Model that is consistent with his/her level of maturity and is appropriate for a particular situation. As a result of knowledge and experience by the supervisor and the teacher, more teacher-directed models of supervision would be in order.

The foundation of structure is found predominantly in the apprentice level but diminishes as one moves up the spectrum. The apprentice level requires less risk for the supervisor but is potentially less rewarding when compared with less-structured models found in the experienced or professional levels. Reward, also defined as incentive, could be gained if supervisors can be open to more teacher-driven types of supervision. Since every supervisor is unique and defines reward differently, the supervisor could experience reward before they reach the professional level as projected in the Escalation Model.

Conclusions and Recommendations

This article represents an exercise in potential theory building that should prove useful for future research and practice related to the supervision of agricultural instruction. Ary, Jacobs, and Razavieh (1996) state that the ultimate goal of educational research is the formulation of scientific theory. They also add that "theories summarize existing knowledge, make predictions, and explain relationships…theories represent our best efforts to explain the world we live in" (p. 17). According to Warmbrod (1986), studies involving teaching and learning should begin and end with a look at theory. Scholars in agricultural education are encouraged to conduct research to test the theoretical propositions presented here. Priority should be placed on researching whether the models may be used effectively for supervising agricultural instruction, confirming or disconfirming the hypothesized link between the model and the development level of the supervisor, and confirming or disconfirming the hypothesized reward/risk spectrum. Regarding practice, supervisors of agricultural instruction can use this model to identify alternate approaches to use in different supervisory situations.

This study demonstrates that there are many options available to supervisors of agricultural instruction. Some questions this might raise related to future research are:

1. To what extent do teacher educators in agriculture use the various supervisory models?
2. What is the relationship between selected university supervisor characteristics and the extent to which levels of the Escalation Model are used?
3. Do supervisor's maturity level match the appropriate levels of the Escalation Model?

4. Do supervisors benefit from using self-directed models with student teachers?
5. Do teachers in agricultural education benefit from supervisors using self-directed models of supervision?
6. Do supervisors benefit from starting with apprentice and progressing through the professional level of the Escalation Model?
7. Do supervisors progress through the levels over time?

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Job Satisfaction of Civil Service and Administrative and Professional Staff in the College of Food, Agricultural, and Environmental Sciences

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Abstract

The purpose of this study was to identify attitudes and perceptions of staff in a College of Food, Agricultural, and Environmental Science regarding job satisfaction. A mail questionnaire was sent to all staff in the College (N = 1,455) with responses received from 875 which was a response rate of 60%. The questionnaire asked staff to rate items in terms of importance and also on how well that item was being demonstrated in the College. Exploratory common factor analysis was used to identify factors related to job satisfaction. The seven factor model showed 42% of the total variance to be common variance. The researchers named the seven factors as follows: factor 1, opportunity for networking; factor 2, open communications; factor 3, informed of decisions; factor 4, meaningful evaluations; factor 5, feeling appreciated; factor 6, job flexibility and variety; and factor 7, need for training. Average difference scores were computed for each factor based upon the perceived importance of the factor and how well that factor was being accomplished in the College. Population parameters were calculated to look at differences among groups on the seven factors. In general for the four groups studied factor 3, informed of decisions, was identified as a major barrier to job satisfaction with factor 2, open communications, and factor 4, meaningful evaluations, as other factors also considered barriers to job satisfaction.

Introduction

Clerical and other support staff personnel comprise approximately forty percent of the higher education workforce (National Center for Education Statistics, 1997). Often times clerical and support staff are on the frontlines of meeting and greeting individuals which play an important role in a student's, parent's, legislator's, or stakeholder's first impression of that university or college. The level of job satisfaction by clerical and support staff should be of concern to middle managers and those in supervisory positions in higher education.

Theoretical Framework

Job Satisfaction

Job satisfaction has been studied extensively (Herzberg, 1959; Locke, 1976; Lee & Wilbur, 1985; Kacmar & Ferris, 1989). However, along with the concept of job satisfaction, employee motivation and workforce commitment also influence employee satisfaction. Motivation is the internal force that drives behavior while workforce commitment is the psychological ownership one has for his/her job in the work environment. These concepts often interact with each other where employee motivation influences job satisfaction or work force commitment while job satisfaction may influence motivation or workforce commitment. For those frontline employees who provide the first impression of the campus environment, job satisfaction is a critical component in making that first impression. Many studies have revealed positive relationship between job satisfaction and productivity (Allen, 1996; Bassi & Van Buren, 1997; Church, 1995; Laabs, 1998; Sauter, Hurrell, & Cooper, 1989; Savery, 1996).

Locke (1976) identified the following working conditions associated with job satisfaction: mentally challenging, work with which one can successfully cope, personal interest in the work itself, work that is not too physically tiring, rewards for performance, good working conditions, high self-esteem, and attainment of interesting work, pay, promotions, and help in minimizing role conflict and ambiguity. In Herzberg's (1959) landmark book, The Motivation to Work, he outlined intrinsic factors such as interpersonal relationships, working conditions, status, and security which influenced job satisfaction. Other researchers have found that extrinsic factors such as salary and employee benefits exerted greater influences on job satisfaction – especially for young workers (AON Consulting, 1998).

The literature is mixed as far as studies on job satisfaction for support staff in higher education. Ford (1992) reported at Mid-Plains Community College employees which included classified staff reported being the least satisfied with rewards which included salary and benefits. However, a survey by the University of Delaware (1996) reported that 48 percent of the salaried staff was very satisfied with their salary and 93 percent agreed that university benefits were excellent. Overall, 71 percent of the salaried staff indicated they were satisfied with their jobs.

However, high pay and benefits alone are not the only components of job satisfaction. Leavitt (1996) found that career development needs are an important component of job satisfaction. Laabs (1998) added another dimension to job satisfaction by stating that managers need to show employees they are needed, valued, and appreciated. This recognition does not have to be financial; it can simply be recognizing a deserving employee as an employee of the month or giving that employee a plaque.

Higher education can offer support staff continued growth through academic and continuing education classes. Support staff could pursue a bachelor's degree while receiving a tuition discount or a waiver. Staff members who perceive growth opportunities are more satisfied and gain increased self-esteem and empowerment (Howard & Frink, 1996).

Even if the salary, benefits and the opportunities for growth are at an acceptable level, one's perception of the work situation may affect the perceived level of job satisfaction. An individual's perception of the work environment may be affected by interpersonal relationships with coworkers, perceptions of campus multiculturalism, internal motivation, involvement in decision-making, and perceptions of the physical work environment. Howard and Frink (1996) found that satisfaction with coworkers had a positive relationship with internal work motivation and general job satisfaction. It is important for college administrators to monitor if minority staff perceives bias or discrimination. Debow-Makino (1993) reported that African American and Hispanic staff members were more likely to report negative responses than respondents who were male, managers, and full-time faculty. Studies have shown that increased job satisfaction and commitment were achieved when employees perceived themselves as involved in decision-making (Sauter, Hurrell, & Cooper, 1989; Locke & Schweiger, 1979).

Union and Nonunion Staff

In the past 20 years unionization of university noninstructional staff has grown (Hurd & Woodhead, 1987). Putten, McLendon, and Peterson (1997) found significant differences between union and nonunion noninstructional staff in higher education on their perceptions of the work environment. Union-affiliated staff members perceived the culture, philosophy, climate, and outcomes of their work environment more negatively than nonunion staff.

Summary

Many variables are involved in explaining and understanding job satisfaction. While many university policies were designed for the needs of faculty, support staff may have different needs and interests. Their needs and concerns should be addressed since they are often placed in the critical role of making that all important first impression.

Purpose

The purpose of this study was to identify attitudes and perceptions of staff in the College of Food, Agricultural, and Environmental Sciences towards making the College a more compelling place to work.

Objectives

1. To describe the College staff demographically
2. To identify factors staff indicated as needs, interests, and concerns in making the College a more compelling place to work
3. To determine if there are differences on the identified factors among the groups studied

Methodology

Subject Selection

The College of Food, Agricultural, and Environmental Sciences sent questionnaires to a census of staff members employed by the college during Spring Quarter, 2000 (N=1,455). A cover letter from the Vice President for Agricultural Administration and Dean was sent with each questionnaire asking staff to complete the questionnaire as a first step in making the College a more compelling place to work. The questionnaire was part of a College process to discover the attitudes and perceptions of staff regarding job satisfaction and to commit to a plan of action for addressing widespread needs, interests, and concerns. A follow-up email reminder was sent to all staff that had not responded within 15 days. All responses were kept confidential with only summary data reported. Responses were received from 875 staff which resulted in a response rate of 60%. No additional follow-up of non-respondents was done.

Instrument Development

The questionnaire was developed by the College Staff Advisory Council drawing upon the knowledge and expertise of the council's various functional subcommittees as well as its membership at large. The questionnaire consisted of three parts. Part 1 of the questionnaire was composed of 40 Likert type items with respondents asked to rank the level of importance of each item toward making the College a more compelling place to work by utilizing a four-point scale (1 - Not important, 2 - Of little importance, 3 – Somewhat important, and 4 -Very important). Part 2 of the questionnaire asked respondents to rank each of the previous 40 items on how well the item was being demonstrated by the College again utilizing a four-point scale (1 – Not demonstrated, 2 – Occasionally demonstrated, 3 – Demonstrated most of the time, and 4 – Demonstrated all the time). A Cronbach's alpha of .93 for the importance rating scale and a .94 for the demonstration scale was obtained. Part 3 of the questionnaire was used to gather demographic data.

Data Analysis

Population parameters including frequencies, measures or central tendency, variability, and correlations were calculated using SPSS version 10.1.0 as a census was conducted. Exploratory common factor analysis using maximum likelihood extraction procedures was used to identify common factors. Based upon the correlation matrix (several correlations above |.30|), Bartlett's Test of Sphericity ($p<.001$), and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (.92), the data appeared appropriate for common factor analysis. The analysis provided a parsimonious number of factors (7) that could be used to represent the relationships among the sets of many interrelated variables.

Two criteria were used to determine the number of factors to be extracted. First, only factors with eigenvalues greater than 1.0 were considered in the analysis. Second, a scree plot of the factor eigenvalues was used to identify breaks or discontinuity in determining the number of factors. The factors were rotated orthogonally using a varimax rotation method with Kaiser Normalization to aid in the interpretation of the factors. Stevens (1992) suggests using loadings of .40 absolute when determining which items are of practical importance in loading on a factor.

A measure of job satisfaction was determined by calculating an average difference score (based upon summated item rating scores divided by the number of items composing a factor) between the importance of a factor in determining job satisfaction and how well that factor was being demonstrated by the College.

Results

The demographics of the support staff are shown in Table 1. Staff could be located in one of the four following areas: the main campus, the experiment station or technical institute both of which are located in a different city than the main campus, an Extension county or district office, or an experiment branch station located in another area within the state. Staff were primarily located in an Extension county or district office, 56.4%, followed by main campus, 25.5%, experiment station or technical institute, 14.9%, and lastly an experiment branch station, 3.2%. Their primary area of appointment was Extension, 67.4%, followed by experiment station, 15.1%, academic unit or department, 13.8%, and technical institute, 3.8%. For average years of service to the College, staff who worked at the experiment station had the most years with 12.8 followed by the technical institute, 9.7; staff who worked in an academic unit or department, 9.5 years and lastly staff who worked in Extension averaged 8.6 years. The majority of staff were administrative and professional, 55.2 % followed by civil service, 44.8%. Administrative and professional staff have a renewable, annual contract whereas civil service staff have a continuing contract after their probationary period. Most staff were full time, 83.2% followed by part-time staff, 16.8%. In summary the profile of a typical staff member in the College was full-time, had an administrative and professional appointment, and worked in an Extension county or district office.

Table 2 reports the factor loadings associated with job satisfaction. The seven factors extracted by the procedure were named by the researchers as follows: factor 1, opportunity for networking; factor 2, open communications; factor 3, informed of decisions; factor 4, meaningful evaluation; factor 5, feeling appreciated; factor 6, job flexibility and variety; and factor 7, need for training. The common variance for the seven factors accounted for 42% of the total variance explained. The seven factor model explained 52% of the total variance.

Table 1. Support Staff Demographics

Demographic:	N	Percent	Mean
Location:			
Main Campus	217	25.5	
Experiment Station and Technical Institute	127	14.9	
Extension County or District Office	479	56.4	
Experiment Station Outlying Branch	27	3.2	
Primary Area of Appointment:			
Academic Unit or Department	117	13.8	
Extension	573	67.4	
Experiment Station	128	15.1	
Technical Institute	32	3.8	
Years of Service to the College:			
Academic Unit or Department	108	14.5	9.5 (sd 9.2)
Extension	494	66.3	8.6 (sd 7.1)
Experiment Station	113	15.2	12.8 (sd 9.2)
Technical Institute	30	4.0	9.7 (sd 7.5)
Type of Appointment:			
Civil Service	377	44.8	
Administrative and Professional	465	55.2	
FTE:			
Full-time	690	83.2	
Part-time	139	16.8	

Table 2

Rotated Factor Matrix of Factors Associated with Job Satisfaction (n = 723)

Item:	Factors 1	2	3	4	5	6	7
Opportunity to make professional connections with staff and faculty from other departments	.73						
Administrative encouragement to work across departmental and college boundaries	.70						
Opportunity to interact with staff and faculty from other departments and programs	.65						
Opportunity to learn what is happening in departments and programs across the college	.60						
My feeling that I am a part of the college	.54						
Spirit of cooperation between departments and units within the college	.44						
Understanding how my work contributes to the larger mission of the department	.41						
Clear communication of departmental decisions to all faculty and staff		.55					
Administrative support for collaboration among faculty and staff in our department		.48					
Open communication between faculty and staff within our department/unit		.45					
Fair implementation of policies at the college level		.43					
Fair implementation of policies at the department/unit level		.41					
Being kept informed of decisions made in my unit that impact my position/responsibilities			.58				
Having a clear understanding of my job responsibilities between my supervisor and me			.53				
Being kept informed of college policies and decisions that impact my job			.51				
Adequate equipment needed to do my job			.41				
Annual review that provides a clear understanding of expectations for future performance				.70			
Assurance that a meaningful evaluation will be conducted each year on my performance				.70			
Performance evaluations that provide a clear assessment of my past year's performance				.68			
Performance evaluations that are based on a realistic set of expectations				.52			
Appreciation of my work by the co-workers in my department/unit					.66		

	Factors						
Item:	1	2	3	4	5	6	7
Knowing that my input is appreciated by my department/unit					.50		
Being appreciated by my supervisor for my accomplishments					.46		
Flexibility in planning and implementing my work						.71	
Variety in my job responsibilities						.52	
Time off provided to participate in training and development							.59
Funding provided to attend training and development programs							.48
Training available to improve technical job skills							.43
Eigenvalue	3.6	2.7	2.5	2.5	2.4	1.8	1.3
Percent Trace	22	16	15	15	14	10	8
Cumulative Trace	22	38	53	68	82	92	100

The data in Table 3 reports job satisfaction by staff location. The larger the mean difference score the more staff rated those items as being important but not well demonstrated in the College. Factor 3 was named informed of decisions which indicate that staff perceived this factor as being important as a measure of job satisfaction but was not well demonstrated in the College work environment. This factor had the highest average difference scores for all four groups studied. This factor included items such as, "being informed of decisions made in my unit that impacts my position and responsibilities," having a clear understanding of my job responsibilities between my supervisor and me," and "being kept informed of College policies and decisions that impact my job." For main campus and experiment station staff factor 2, open communication, was a close second. This factor contained items such as, "clear communication of departmental decisions to all faculty and staff", and "fair implementation of policies at the college and departmental level."

Table 4 reports job satisfaction by area of appointment again using average difference scores. Once again, the larger the average difference score the less that factor is contributing to job satisfaction as measured by staff. Factor 3 which was named informed of decisions had the highest average difference scores except for the Technical Institute where that factor was the second highest. In the overall ranking, factor 3 had the highest average difference score which indicates that being informed of decisions is not contributing to staff job satisfaction. For Extension and experiment station staff factor 4, meaningful evaluation was a close second. This factor included such items as, " annual reviews that provide a clear understanding of expectations for future performance," and "performance evaluations that provide a clear assessment of my past year's performance." For staff in academic units or departments and the technical institute factor 2, open communications, was a close second and included items such as, "clear communication of departmental decisions to all faculty and staff" and "fair implementation of policies at the college and departmental levels."

Table 3. Job Satisfaction by Location using Average Difference Scores

Location:	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Main Campus							
Mean	.69	.81	.84	.70	.62	.44	.57
Standard Deviation	.64	.67	.64	.84	.73	.71	.76
N	192	191	207	194	201	208	205
Experiment Station							
Mean	.55	.89	.92	.82	.74	.45	.49
Standard Deviation	.61	.69	.66	.99	.83	.77	.70
N	117	115	122	121	121	125	122
Extension							
Mean	.47	.69	.83	.81	.74	.40	.45
Standard Deviation	.64	.66	.61	.94	.76	.64	.74
N	435	425	467	451	459	471	471
Experimental Branches							
Mean	.48	.73	.90	.83	.70	.12	.23
Standard Deviation	.51	.36	.53	.93	.71	.60	.68
N	25	24	27	27	27	25	25
Overall							
Mean	.54	.75	.85	.77	.71	.41	.48
Standard Deviation	.64	.66	.62	.92	.76	.68	.74
N	769	755	823	793	808	829	823

Table 4. Job Satisfaction by Area of Appointment using Average Difference Scores

Appointment Area:	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Extension							
Mean	.53	.73	.83	.77	.71	.41	.47
Standard Deviation	.66	.67	.63	.93	.76	.64	.74
N	515	508	557	536	552	559	562
Experiment Station							
Mean	.52	.83	.89	.84	.71	.37	.43
Standard Deviation	.61	.68	.70	1.0	.83	.78	.67
N	117	115	122	119	120	126	120
Academic Unit/Dept.							
Mean	.54	.72	.86	.69	.62	.45	.63
Standard Deviation	.51	.56	.55	.75	.65	.73	.80
N	106	102	114	107	106	111	109
Technical Institute							
Mean	.68	.99	.93	.81	.70	.42	.47
Standard Deviation	.49	.58	.48	.90	.80	.64	.61
N	30	29	31	32	31	32	31
Overall							
Mean	.54	.75	.84	.77	.70	.41	.48
Standard Deviation	.63	.66	.62	.92	.76	.68	.74
N	768	754	824	794	809	828	822

Table 5 reports job satisfaction by type of appointment using average difference scores. Factor 3, informed of decisions, had the highest average difference score for both civil service and administrative and professional staff. For civil service factor 2, open communications, was the next highest followed closely by factor 4, meaningful evaluations. For administrative and professional staff factor 4, meaningful evaluations, was the next highest followed by factor 2, open communications. Those three factors were the most important in determining job satisfaction for staff by appointment.

Table 5

Job Satisfaction by Type of Appointment using Average Difference Scores

Appointment Type:	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Civil Service							
Mean	.59	.86	.89	.85	.78	.51	.47
Standard Deviation	.64	.67	.67	.96	.75	.72	.68
N	326	322	363	343	357	361	361
Admin. & Professional							
Mean	.49	.67	.79	.72	.62	.32	.48
Standard Deviation	.62	.62	.56	.88	.75	.62	.78
N	435	428	454	443	445	459	453
Overall							
Mean	.54	.75	.84	.78	.69	.40	.48
Standard Deviation	.63	.65	.61	.92	.75	.67	.73
N	761	750	817	786	802	820	814

The data in Table 6 reports job satisfaction by full-time or part-time status. For both groups factor 3, informed of decisions, had the highest average difference scores. For full-time staff factor 4, meaningful evaluation, was rated second followed closely by factor 2, open communications. For part-time staff there was a tie between factor 2, open communications and factor 4, meaningful evaluation; the next highest was factor 5, feeling appreciated which include items such as, "appreciation of my work by the co-workers in my department" and "knowing my input is appreciated by my department."

Table 7 reports the relationship between years of service in the College and job satisfaction. For factors 1 (opportunity for networking), 3 (informed of decisions), 6 (job flexibility and variety), and 7 (need for training) the analysis revealed a negative correlation which means that the longer a staff person has worked in the College the more dissatisfied they were in relation to what those factors identified. For factors 2 (open communication), 4 (meaningful evaluation), and factor 5 (feeling appreciated) the correlation was positive which indicates that the longer the years of service a staff member had, the more satisfied they were in relation to what the factors identified. Out of seven possible factors, four of the factors had a negative relationship. However, the reader is cautioned that all correlation coefficients were very low.

Table 6

Job Satisfaction by FTE using Average Difference Scores

FTE:	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Full-time							
Mean	.55	.78	.86	.80	.71	.41	.50
Standard Deviation	.64	.67	.64	.93	.77	.67	.75
N	626	613	670	640	653	670	667
Part-time							
Mean	.50	.64	.76	.64	.61	.34	.45
Standard Deviation	.62	.61	.51	.88	.71	.65	.66
N	119	121	132	133	134	135	133
Overall							
Mean	.54	.76	.84	.77	.69	.40	.49
Standard Deviation	.64	.66	.62	.93	.76	.67	.74
N	745	734	802	773	787	805	800

Table 7

Relationship between Years of Service in the College and Job Satisfaction Average Difference Score by Factor

Factor:	Correlation (r)
Factor 1	-.09
Factor 2	.04
Factor 3	-.03
Factor 4	.02
Factor 5	.02
Factor 6	-.05
Factor 7	-.06

Conclusions and Recommendations

The demographic data for the staff in this study revealed that a typical staff member in the College was a full-time, had an administrative and professional appointment, was employed in an Extension county or district office, and had an average of 8.6 years of employment in the College. The following seven factors were identified and named by the researchers: factor 1, opportunity for networking; factor 2, open communications; factor 3, informed of decisions; factor 4, meaningful evaluation; factor 5, feeling appreciated; factor 6, job flexibility and variety; factor 7, need for training.

Interestingly, factor 3, informed of decisions, emerged as the major factor which was a barrier to job satisfaction. In other words staff rated that factor as being important to them but they did not perceive the College as providing adequate communications regarding decisions that may affect their jobs, having a clear understanding of what their job responsibilities are, being informed of College policies and decisions that may affect their jobs, and having adequate equipment needed to do their job. This factor was rated the highest by all four groups when the groups were selected based upon location, type of appointment, and FTE status. It also came in second to factor 2 in one table which looked at area of appointment. This finding seems to support the studies of Sauter, Hurrell, and Cooper (1989) and Locke and Schweiger (1979) both of which stated that increased job satisfaction and commitment were achieved when employees perceived themselves as involved in decision-making. In order for employees to be involved in decision-making, they first have to be informed as to what the College has decided and be in the "loop" before they can be involved in the decision-making process. For staff in the College of Food, Agricultural, and Environmental Sciences they value being informed but they do not perceive the College is informing them of decisions that may influence their job responsibilities. This finding also supports Laabs (1998) study which found that job satisfaction is affected by how managers show employees are needed, valued, and appreciated. It is difficult to feel needed, valued, and appreciated when you are not a part of the decision-making process – even when is affects your job responsibilities.

While the job satisfaction literature is mixed on what constitutes job satisfaction, the intrinsic and extrinsic factors outlined did not play a major role in this study. Part of this may be explained by the type of questions asked but in general the communications area (factors 2 and 3) were the biggest barriers to job satisfaction. The other factor which played a part in job satisfaction according to this study was factor 4, meaningful evaluation. Once again, the literature did not reveal much about an employees' evaluation as a measure of job satisfaction, but in this study evaluation was an important factor in job satisfaction. Generally, the staff in the College did not perceive that their yearly evaluations were providing them with clear direction of future expectations as well as not doing a very good job of evaluating the past year's performance. This area needs to be looked at by the College office since a staff member's evaluation should be meaningful to the staff person and the College. If there is a misunderstanding of what the evaluation is showing between the staff member and the College, how is a staff member supposed to improve?

This study did not support the findings of Howard and Frink (1996) which indicated that if staff perceive growth opportunities, they are usually more satisfied. Factor 7 was named need for training and the average difference did not indicate that staff felt this was a barrier to job satisfaction. This finding is confusing in that academic and continuing education are offered but maybe staff are not encouraged or in some cases allowed to attend. This finding is worth future research to determine if staff are encouraged to attend classes and if not, what are the barriers that are preventing staff from pursuing these growth opportunities? It may be that some staff are not interested in attending classes, but some Colleges have access to video conferencing where classes are taught in the same building where staff are employed.

Generally, job satisfaction increases with age (Lee & Wilbur, 1985). For staff in the College age was not asked in the demographic section but the number of years worked in the College was asked. It could be assumed for this study that the longer a staff member was employed in the College the more satisfied that person was. This study found that in some instances the longer a staff member was employed in the College the less satisfied that person was. This was true for factors 1 (networking), 3 (informed of decisions), 6 (job flexibility and variety), and 7 (need for training). So, the longer a staff member works in the College the less satisfied they are with the opportunity to network, being informed of decisions, job flexibility and variety, and the need for training. As a recommendation, the College should investigate these areas since the employees who have the higher number of years are not satisfied with these areas. Especially important are job flexibility and variety and the need for training. If staff are not satisfied in these areas, they could find employment elsewhere and the College would lose some of its employees who have the most experience. These employees are difficult to replace. Also, some of these staff members are on the frontlines and if they are bored with their jobs and do not perceive any growth opportunities (Howard and Frick, 1996), they may not be contributing to that all important first impression which serves the College well – especially with prospective students, parents, and legislators.

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Agricultural Education in an Elementary School: An Ethnographic Study of a School Garden

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Abstract

The purpose of this study was a phenomenological understanding of the impact of an agricultural education garden-based curriculum on the students and teachers of an elementary school in the Midwest. Specifically this study was an exploration of our children's relationship to land and food and what it might offer teachers struggling to engage students in the learning process. A philosophy supporting emergent, participatory inquiry was developed and sustained for this project. Research participants were encouraged to fully engage in the identification of important issues, questions, planning and vision for the garden. Sensitivity to local knowledge and appropriate methods became guiding principles of this project. Data were collected utilizing multiple qualitative methods including: participant observation, dialogue, interviews, photo elicitation, and student work. Data were content analyzed following Lincoln and Guba's (1985) adapted constant comparative method for use in naturalistic inquiry. Data analysis was highly recursive, informing and increasing the sophistication of the inquiry. Appropriate criterion for validity and authenticity of this study were developed which included: catalytic validity, triangulation of data, reflexivity, and grounded understanding. The write up of this study took the form of an ethnographic case study. Findings and conclusions from this ethnography included: 1) an agricultural education garden is a potent force in re-shaping school culture; 2) an agricultural education garden is a leverage point for reversing the loss of time, control and place in teachers' and students' lives; 3) the agricultural education garden connected students to the organizing principle of experience; 4) the agricultural education garden became an important place for teachers' and students' self-expression, creativity and innovation, 5) agricultural education gardening activities changed the status of food as a commodity for consumption to a portal for communal good.

Introduction

This study is an exploration of our relationship to the land and what it might offer agricultural educators struggling to engage children in the learning process. But it is a bit more than learning processes alone. For if we view education as a cultural template for the next generation we must then ask, to what extent do we as agricultural educators abet the human-nature separation and concomitant fragmented worldview that threatens our very existence? The question them becomes, what is the potential of this powerful living force to *sustain and connect* our children mentally, physically, and socially in our educational institutions?

Researchers have been examining this question of human-nature interaction in a concerted effort since the 1970s under the umbrella of horticultural therapy, sociohorticulture, and environmental education (see for example, Kahn (1999); Kaplan & Kaplan (1983); Lewis (1979); Sheffield (1992)). Studies from these disciplines have demonstrated with varying degrees of success that gardens provide a useful venue for experiential learning both academically and developmentally. These studies establish a foundation for the justification of further inquiry, yet questions remain that cannot be answered with conventional measurement and experimental design. Something significant occurs between plants and people that cannot be captured with quantitative evaluation alone. Constructivist methodologies may help us gain an understanding of the garden that is deeply embedded in the stories teachers tell, the language children use, the culture of the school, and the historical context of this study.

Purpose of the Study

The purpose of this study was a phenomenological understanding of the impact of an agricultural education garden-based curriculum on the students and teachers of a midwestern elementary school. The qualitative methodologies of dialogue, participant observation, prolonged engagement, and reflexive field notation were used to contribute an alternative form of knowledge construction to the existing body of research concerning school gardening as agricultural education. A philosophy of *praxis* or reflective action, was foundational to the purpose of this study, whereby research participants were empowered to become more aware of agriculture and life sciences and are afforded greater agency to act upon this knowledge in their social settings.

Statement of the Problem

An elementary school in the mid-west was struggling with declining standardized achievement test scores. Although various sorts of interventions were suggested in the literature (Kohn, 1999) and have been implemented at the school to deal with this situation, few seem to work. Therefore, the problem for this study was to discover how agricultural educators might re-connect students to school via a garden.

Research Questions

Acknowledging the aforementioned research problem, the following questions were designed as specific points of entry to this study:

Research question 1: How does a school garden affect students? The goal of research question #1 was to gather interview and observational data regarding any changes (academic, attitudinal, social, etc.) that may occur as students use the school garden.

Research question 2: How does a school garden affect teachers? The goal of research question#2 was to gather interview and narrative data concerning any changes that may occur as teachers use the school garden.

Research question 3: Which lessons/activities in the garden are perceived as useful to facilitate learning? Likewise which activities were not useful to facilitate learning? The goal of research question #3 was to gather data from both teachers and students regarding the garden-based curriculum and its effectiveness in meeting state science standards and objectives.

Research question 4: What if any constraints limit or undermine the use of the garden? The goal of research question #4 was to identify any barriers or impediments that prevent the effective use of the garden by students and teachers.

Theoretical Framework

Human development coupled with environmental awareness or connection with nature is a theory repeatedly emerging in the literature from as far back as the eighteenth century. Rousseau (1950) and Pestalozzi (1977) both argued that direct sensory contact with the natural world during childhood was critical to the healthy development of children. This bears striking similarities to more contemporary pedagogies of place found in the literature. Developmental theorist, Jean Gebser (cited in Chowla, 1994) worked out human development based on what he termed primeval trust or confidence in our relationship with the processes of nature. Pearce's (1977) model of development suggests that children enter a stage from ages seven through fourteen when the child's "safe place" or "significant world" is the natural world. During this time, called the "earth matrix" the individual is most at home and gains strength from places outside the home in nature. This bond, which is essential for healthy maturation into the next stage of development, is created in the process of close personal experience with the earth.

Peter Kahn (1999) has proposed a structural-developmental or constructivist approach to this question of development. Kahn theorizes the human relationship with nature is in fact a combination of both endogenous (innate wisdom or genetic) and exogenous (experientially stimulated) forces. He suggests the need for transformative learning processes that empower children to construct their own values and truths about the natural environment. Central to Kahn's thesis is a movement toward increased student involvement in shaping curriculum based on their interest or fascination with nature. Rachel and Steven Kaplan (1989) have contributed a wealth of research findings regarding the restorative benefits of gardening or what they have termed "nearby nature. Kaplans suggest that fascination with nature holds substantial potential psychologically. The importance of this concept lies in its restorative ability to achieve cognitive clarity for those involved in gardening. Kaplan and Kaplan found yet another particularly intriguing byproduct from gardening that merits consideration, people that garden experience a "sense of control" in their efforts. From a psychological standpoint "sense of control" is especially important for individuals that routinely experience a loss of control in their lives. McNally (1990) made similar conclusions in her studies of people's valued places. McNally's respondents consistently mentioned the garden as, "a place to depend on and participate in" (p.173). Charles Lewis (1990) has written and documented gardening as a healing process for well over two decades. A healing transformation can occur at the level of the individual or at the much broader level of community. Wendell Berry (1977) has written calling for a broader concept of health that reunites not only our mind and body, but also our communities through localized agriculture.

Currently, most public schools are driven by performance on state and national academic achievement tests. With the present resurgence of a "back to basics" or technocratic approach to education there is ever increasing pressure to streamline curriculum in an effort to serve economic or market driven goals in education. Proponents of the gardening movement in schools have only begun to reflect the pressure to demonstrate improved academic performance in the design of their research and curriculum. Ogorzaly (1996) reports the most telling illustration of this single-minded focus on test scores in her study with third-graders. Ogorzaly's innovative research involving gardening and cooperative learning was the recipient of the 1994 Presidential Environmental Youth Award, yet the following year a new program was chosen to replace gardening because of its purported ability to raise test scores. Sheffield (1992) and Brunotts (1998) claim improved academic performance as a result of school gardening programs, yet these claims are marginal upon close inspection of the studies. In a three-year study of classroom gardening involving 300 students, Hendren (1998) was unable to report any significant difference in academic achievement as a result of the gardening program utilized. Overall there is a scarcity of empirical evidence in the literature describing any significant correlations between gardening programs and academic performance.

Methodology

Emergent design is axiomatic to naturalistic inquiry (Lincoln & Guba, 1985). For, as the authors state, "it is inconceivable that enough could be known ahead of time about the many realities to devise the design adequately" (p. 41). With receptivity to the emergent nature of phenomena we shift from product orientation to a process orientation. The research design becomes nimble, adaptable and exquisitely finessed to the local context of the study.

Sampling Procedure

Purposive sampling (Patton, 1990) was utilized to locate informants willing to converse about their experiences with the garden and garden-based curriculum. The power of purposive sampling is situated in its ability to ground the inquiry in emic views of local respondents. Typical of a qualitative study, this project focused in-depth on a relatively small sample of 5 teachers and 40 students from one school.

Data Collection Methods

Data collection was carried out utilizing multiple qualitative methods, including: interview, conversation, observation, photo elicitation and document analysis. These methods were selected because of their fit to the phenomenon of study.

Interview and Dialogue

Unstructured and semi-structured interviews were a source of data throughout the course of this study. Interviews were intermittently scheduled throughout the 2000-2001 school year. All interview participation was strictly voluntary, and respondents were informed of their rights as human research subjects prior to any interview through the use of a consent form. Protocols for both student and teacher interviews were developed based on the research questions for this study. The protocol is a tentative set of questions that will set in motion a recursive flow of information through participants in this hermeneutic process. Student interview protocols were collaboratively developed with the teachers participating in this study. This collaborative effort allowed teachers to participate in a process through which new evaluation practices (i.e. locally constructed rubrics as opposed to nationally developed normative standards) might be established, refined, or sustained. Initial interviews were unstructured, allowing for respondents to make known their constructions of the garden unrestricted by my prompts. As trust was gained and emic constructions began to take form, the interviews became more structured, tracing the patterns of the emerging hermeneutic circle. Built into the hermeneutic process is the possibility for triangulation, emendation, reconstruction, and verification of data (Lincoln and Guba, 1985).

Participant Observation

Extensive field notes were collected from participant observation during the researcher's year on site at the elementary school. Guba & Lincoln (1981, p.193) state that the basic methodological arguments for participant observation may be summarized as these: "[O]bservation maximizes the inquirer's ability to grasp motives, beliefs, concerns, interests, unconscious behaviors and the like. Observation allows the inquirer to see the world as his subjects see it, to live their time frames, to capture the phenomenon in and on its own terms, and to grasp the culture in its natural, ongoing environment."

Documents

Documentation (written or recorded material not prepared specifically in response to a request from the researcher) also served as a source of data in this study. Lincoln and Guba (1985) detail the usefulness of documentation to include: stability of information, contextual relevance, richness of information, natural language of the setting, and finally, documents are non-reactive. Student garden journals, maps, stories, poetry and artwork were collected and interpreted for insights into the garden experience of the children.

Photographic images

Douglas Harper (2000) in describing photo elicitation as an underutilized qualitative method encourages researchers to construct a "visual narrative." These visual images encourage readers to take a closer look at the small social worlds of our inquiry. Visual imagery adds a layer of complexity to our texts and representations pointing at specific moments of human interaction. I found that photographing the teachers and children during their participation in the project was one of the least obtrusive and most "natural" methods of data collection available to me. Photographing became *a culturally acceptable method* of data collection at the research site.

Naturalistic Data Analysis

Data analysis in this study followed naturalistic data analysis guidelines as described by Lincoln and Guba (1985). Naturalistic data analysis differs from conventional analytic methods in that it is carried out throughout the entire course of the study. Naturalistic data analysis is not a linear process; rather, it is a highly recursive function. In using this method questions are developed, data is gathered, questions are refined, more data is gathered, data is analyzed, increasingly sophisticated questions are posed, more data is gathered, and so on. As one can see, the process has a built in mechanism for self-correction and validation.

Content Analysis

Lincoln and Guba (1985) adapted Glaser and Strauss' (1967) constant comparative method for use in naturalistic inquiry. It should be noted this process was developed by Glaser and Strauss for the development of theory, not simply processing data. Lincoln and Guba suggest the term "construction" be substituted for "theory" in adapting this method. Use of content analysis followed the stages based on Lincoln and Guba's strategy: unitization of data, comparing units for categorization, memo ideas, integrating categories and their properties, delimiting the construction/theory.

Credibility and Trustworthiness Criteria

It is important to judge the quality or validity of phenomenological inquiry by standards appropriate to the paradigm. The following criteria were used to evaluate the trustworthiness of this study:

Catalytic validity. Research is judged by the "degree to which the research process re-orients, focuses, and energizes participants" (Lather, 1986, p. 67).

Triangulation. The authenticity of constructivist inquiry is reinforced by seeking multiple data sources, methods of data collection, and theoretical schemes (Lather, 1986; Lincoln & Guba, 1985).

Reflexivity. As a standard for evaluating quality, Richardson (1999) explains that in qualitative and ethnographic texts we offer critical reflexivity about our role as researcher in the research context as a valuable analytical practice. Persistent reflexivity indicates how our working theories have changed by the logic of the data gathered along the way.

Understanding. Harry Wolcott (1994) describes that in understanding he seeks "a quality that points to identifying critical elements and wringing plausible interpretations from them" (p.366). Yet he cautions that there is never a single, exact set of circumstances with a "correct" interpretation. Similarly, Richardson (1999) asks if our work contributes to an understanding of social life from a grounded or "embedded" perspective.

Case Study

Introduction

Consistent with the research reporting form for qualitative research, this case study is reported in first person with "thick description" (Geertz, 1973) of the research site and participants an integral part of the report. The headings for the case study identify major themes revealed in the researcher's findings.

Background

As you will soon see this is a story about moments of becoming, and wonder and connection at a small elementary school in the mid-west. Traveling the rural road out to Jonesville School for my first day on site I am struck by the pastoral beauty of the farmland that surrounds the school. Strip malls and commercial enterprises of the city give way to tidy homesteads, cornfields and wide-open vistas. Paradoxically though, the children of this school are not farm children. This "outpost" (a term frequently used to describe Jonesville) of the district actually serves three decidedly urban neighborhoods in the surrounding community. Children are bussed in from the inner city and two low-income mobile home neighborhoods. As a result, much to my surprise, the school population is an ethnically diverse mix of African American, Hispanic, Asian, Arabic, and Native American. District-wide over forty languages and dialects are spoken. Teachers proudly tell me, 'this is our strength' and it truly is one of their many strengths. Yet this glorious strength comes at a mighty price for these are the faces of poverty; 58% of the 260 students are on the Federal Free and Reduced Lunch Program. This number I have come to find out is a powerful number in the education business. Kristy, one of my key informants looked me dead in the eye "That number is very telling you know," I shake my head, no I don't know, " Alfie Kohn (a noted educational researcher) can look at that number and tell you within a few percentage points what your standardized assessment scores will be. There is a direct correlation between privilege and test scores." "So why bother," I wonder aloud marveling at teachers' perseverance to perform against losing odds "Right." Kristy agreed, "Why bother? And here is the kicker, Kohn (1999) admonishes us as teachers *not* to try and beat these odds, because he says if we do happen to pull our scores up slightly that means we are teaching to the test and deep, meaningful, learning has been abandoned." And yet, after only a few days at school I saw that deep, meaningful learning had *definitely not* been abandoned by these dedicated, and caring educators. In fact, Jonesville School prides itself in its unique educational philosophy within the district. Jonesville teachers have made a commitment to a multi-age or "streaming" approach to learning. Here children are grouped K-2, 2-3, and 4-5 (these groupings are not fixed, they change according to the needs of the school population) shifting the focus away from annual promotion to a child's unique readiness. There is an ethos of student-centered learning that pervades throughout the building. Sadly, though, bubbling just below the surface of this marvelous environment of caring I see and hear strains of fear and anger at our current system of schooling.

The Culture of Schooling

In an effort to chase improved standardized academic achievement scores, curricular change has become constant. Betty, a seasoned veteran of 22 years in the district muttered under her breath to me, "Mandates and change, we are faced with this constantly. Eventually, I don't know, three years, five years, ten years down the road you just shut down. You go back to your room, shut the door and teach from the basal." Overhearing this comment Gloria leans forward and tells me their union is writing a response to the district concerning curricular change.

"Accountability is big! Our product is our test scores." Kristy explained. The Superintendent of this school district uses what was referred to as a "corporate model" of management. One can easily see how conflicted the teachers feel about the values that surround this ethos. The teachers understand the constituent unrest concerning education that this new Superintendent finds herself, yet these dedicated teachers are hesitant to play the numbers game. Playing the numbers game is a constant balancing act for the principal of Jonesville. Pat has a healthy respect for these numbers as principal of this "underperforming school" yet she provides a strong counterbalance to the oppressive district obsession with numbers. A powerhouse of positive energy, Pat has lead her teachers through threats of school closure, shrinking budgets, staff reduction and constant pressure for numeric success.

As an underperforming school, Jonesville is all too familiar with the promises from the current interventions touted in the education literature. Jonesville teachers were highly skeptical and defensive of promises to improve their academic 'report card.' One afternoon while talking with Kristy, one of my key informants, she said, "Do you know we currently have a three year attrition rate!"? When I asked her why this was so she replied, "[It is] due to isolation, to the increasing needs of our children and to state and district demands." Her voice trailed off wearily gazing at the usual 4:00 pm chaos of the classroom, finally landing her focus on the piles of paperwork on her desk as if to say, "Would you last three years at this?"

The Grace of a Garden

To say that this school was badly in need of something to crow about or a source of pride is a start, but I am now convinced that pride is only half of the story. The garden created a space amid all the turmoil for us to feel graced. This state of gratefulness was a critical foundation for the success of the garden. The teachers, staff and children were able to view the world through a different window because of the garden. They were able to feel blessed rather than cursed. By late August and the advent of a new school year, the garden had exploded into a cornucopia of flowers and vegetables. The garden was bursting at the seams and so were we with pride in our accomplishment; this year there was a garden instead of a prairie! Faculty and staff all agreed we needed to contact the local newspaper and share our accomplishment with the world. After arranging for a reporter and photographer to visit Jonesville an interesting thing happened, we all started talking about the "story" we wanted to tell. Did we want to tell about our amazing crop of tomatoes and our homemade salsa? Did we want to tell about our incredible, giant pumpkin or our sunflower jungle? As an ethnographer this would be a story within a story. What would they deem as important in the telling of the garden story? Their answer emerged from the garden. By this time, the second week in September, our turnip crop was literally begging to be pulled from the ground. These were no ordinary turnips, mind you, these were "great, big, giant, enormous turnips." It was brought to my attention by Carol that a children's book had been written telling a story of teamwork, cooperation, and communal nourishment around the removal of a giant turnip from a farmer's field. *This* was the story Jonesville School wanted to tell. At the appointed hour we all lined up (hands on waists just as in the story) and *together* we pulled our giant turnip—POP, click-- for the reporter and photographer. This little bit of positive recognition empowered this "underperforming" school to author a new story. A story not based on performance but on hope, and beauty, creativity and community. The amazing growth of a 59¢ packet of turnip seeds had empowered these teachers and children to have a voice in a system where it is mighty difficult to be heard.

We Enjoyed the Creativity

Affirmed by the success of the giant turnip emergent lesson, Carol and Gloria continued to look to the garden for inspiration in their planning. These confident and experienced teachers saw the living dynamics of a garden as a perfect match for their philosophy of teaching and learning. Explaining that real learning is difficult to plan, Gloria said to me, "We often 'plan' after the fact, or 'plan' as we go." Chuckling Carol added, "Gloria and I call this planning in the doorway." And isn't this the nature of all knowing and inquiry? I saw this in my own attempts to plan this research project; I was now letting go of my "plans" and developing a situated methodology or "plan in the doorway."

My collaboration with Gloria and Carol has been one of the most rewarding experiences of this project. The creative lessons we have generated together throughout the year have now grown into an entire immersion literacy process lovingly referred to as: "Books We Have Eaten." Attempting to describe how this process evolved Gloria mused, 'Food emerged in the garden, we found a literature connection, we designed a lesson, we cooked, and finally we hooked it to the curriculum.' Nature drove the process not the curriculum guide; we had turned the system on its head. The garden-based learning activites naturally emerged; advance planning would have changed the dynamics, ignoring the interest and curiosity of the teachers and students. Giving us a curriculum makes it a requirement. We enjoyed the creativity of asking, 'How can growing pumpkins be a literacy activity?'"

<u>This Has Gone Cross Curricular</u>

Stephen Toulmin (1982) reminds us to see disciplinary boundaries as historical "accidents." Witnessing the strain against these accidental boundaries in my work with the teachers and children of Jonesville, I have come to believe that the garden is a portal through the confines of disciplinarity. Corn seeds, ladybugs, children and pumpkins know nothing of these artificial confines. Elementary school teachers also feel closer akin to a way of knowing that cannot be subdivided into tidy categories. During a conversation I had with Carol she explained her frustrations with the current mandated curriculum, "We work with isolated content (math, science, social studies, language arts) that is handed down and treated like secondary—separated content areas. The garden helps us draw connections across the curriculum, it is material to scaffold."

<u>The Garden as a Place of Connection</u>

The data speaks very clearly to the garden as a place for connection: connection to each other, to food, to place, and surprisingly to me. I witnessed the common unity—community—that happens when people work side by side towards a shared vision. The garden became a place of connection because it operates according to different rhythms. You cannot hurry a garden, it is beholden to a temporal pace unaffected by human clocks and schedules. Stepping out of the classroom and into the garden one enters a place of slow rhythmic continuity. For our children the garden offers an alternative to the discontinuity and fragmentation of our modern culture. Questions of personal gain versus collective good seemed to slip away in our garden ecosystem. Released from the culture of separation and personal ambition that is transmitted in schooling, the Jonesville students reveled in the freedom to work together for communal good. The school-wide enthusiasm generated by the garden reminded one teacher of "the feeling experienced long ago when communities would celebrate the harvest together." Proudly standing among the beans and corn of the 3 Sisters Garden Betty concurred, "I see the garden as a way to develop self-sufficiency, to learn that survival depends on everybody."

Gustavo Esteva (1994) speaks of the fire at the heart of communal life, a primal organizing principle called *comida*. Difficult to translate, *comida* refers to a sense of community where scarcity cannot appear. *Comida* as I understand it is much more than cooking food; it is a complex caring relationship with the fruits of the earth and each other. I have only just stumbled onto this marvelous concept, after the fact, so to speak yet I cannot help but believe that *comida* is what we experienced. Cooking our homegrown produce became an integral part of the garden experience emerging directly from my feminine instinct to nourish these children of poverty. Conducting scientific experiments in our garden would have grossly missed the point—remaining hostage to the intellectual culture of science while ignoring the larger issues of existence.

They Are So Removed From Experience

If there is any hope for reinvigorating our system of science education I believe it will be found not by increased teacher accountability, not with more rigorous scientific curricula, but rather through our sense of wonder. I am guilty I'll admit it. I arrived on the scene thinking that by connecting garden activities to the state mandated science curriculum I could somehow save the day. Instead what I found was that at the heart of scientific inquiry is good old-fashioned slack-jawed wonder. "Mrs. Thorp look at how big this turnip is!" "Laurie, the wheat is up!" For the children of Jonesville School the garden provided a complex, living environment ripe for experiential learning. The teachers often stressed the importance of the garden as a space for children to expand their life experiences, a place to interact with nature increasingly absent in their lives. In our push to quantify academic achievement we have got it all backwards. We pose questions to the world as we come to know the world not the other way around. We're asking these kids to question a world they know nothing about. Over and over I heard teachers tell me these children have very limited life experiences. When you're an inner city, latchkey kid, told to 'stay indoors when you get home from school' a 25'x 25' garden is a big wide world of wonder.

Can I Have One To Take Home?

I have to tell you I've saved the best for last. Hold on to your hearts they don't get any better than this. This is what makes research so darn rewarding. Just when you least expect it the data jumps out at you with a showstopper. And the best part, I can really toot this horn because I didn't figure it out, no, not me. I puzzled and puzzled, cogitated and scrutinized, and finally yelled 'Uncle.' So I took this hunk of data to Kristy and said, help. She looked at it briefly and nearly took my breath away with her powers of insight and interpretation. You see over and over the children's voices in the data spoke of wanting to take artifacts from the garden home. Didn't matter the size, shape or condition, it could be one sunflower seed or an old bloated cucumber from the compost bin—but, 'Please Laurie can I have it to take home?' These stories and experiences kept piling up but what did it mean? Why was it so important to take the fruits of the garden home? Scarcity? Pride? Approval? Was this true of all their schoolwork? Was there a need to take everything (artwork, science experiments, projects) home? "No," Kristy replied, "They are taking seeds and squash home because a teacher never touched it." She continued rapid fire, "There has been no interference, you see, tomatoes and cucumbers are safe to go home because they have not been interpreted through the hierarchy of the school. Seeds and gourds are not a school product; they are completely untouched by human hands, they don't bear our stamp of approval." Kristy continued, "Oh yeah, I noticed this. Remember the giant sunflower head you brought in the room? It never exhausted itself. Those kids would pet, pocket and eat sunflower seeds without ever tiring of the experience. These children are awash in the artifacts of *schooling*. Textbooks, progress reports, vaccination records, permission slips all bare the mark of school approval. All are tainted with the scent of authority, slowly stripping away any notion of self-realization. As our evening drew to a close she looked me in the eyes and said, "By the way, that is also why the children love you. You're the Garden Lady. They don't associate you with school. Be careful, if you become too closely aligned with the school you'll lose your magic."

Conclusions

1. We know that culture is molded by the characteristics of the environment. Add a garden to the school environment and sure enough, the culture changes. A living garden is a potent force in re-shaping school culture. The Jonesville garden catalyzed cultural transformation, symbolizing and sustaining hope, growth, and community. "Underperforming school" no longer holds the cultural identity it once had.
2. As teachers and children continue to experience loss of time, loss of control and loss of place in their lives, the garden is a powerful leverage point to reverse these processes. For a very small investment of space and money the garden has provided a venue for healing these wounds of modernity. The larger rhythms present in our little 30' x 30' plot of earth cannot be segmented, fragmented, or disconnected; they patiently await our arrival.
3. The garden connects children to the organizing principle of experience. Our children are starved for experience. We are cutting children off from the very life forces that sustain us: earth, sun, rain, plants, and animals. They are sending us signals as they only know how, they wiggle, they squirm, they "act out" and tragically we medicate. In the garden children experience comfort, security, belonging, pleasure, and wonder associated with our experience of a living cosmos.
4. A plot of soil with a packet of seeds can become an important place of self-expression. We are all trying to create ourselves, to become uniquely alive; tending the earth ignites our creative life force. Gardening allowed teachers and students to feel more uniquely present in their work and in their lives.
5. Finally, gardening changes the status of food for all involved. When one gardens, food can no longer be viewed as a mere commodity for consumption; we are brought into the ritual of communal goodness that is found at the intersection of people and plants. Food that we grow with our own hands becomes a portal for personal transformation. Somewhere at the intersection of food, fire, earth, and humanity something sacred happens.

Recommendations for Research

1. Open yourself to emergent design. Emergent research, emergent planning, emergent process, emergent teaching, emergent learning, emergent anything. Go ahead; let it unfold. I promise you won't be disappointed. By remaining open to the unknown we allow space for people to engage with their most pressing issues. It is liberating. Let go

the reins of control and listen; you can't imagine what you'll hear, and what you'll learn and most importantly, what you'll do.

2. While you are there, stay awhile. Stay a long while. You'll be tempted to leave, but don't. Stay with the process and remember it takes time. Hang with it, we are complex, tangled, contradictory beings, we. The pay is atrocious and the hours are long but stay with it. You will be rewarded, this I promise. You'll turn the corner and never look back. Prolonged engagement pays dividends in currency rarely traded these days: care, commitment, and human understanding. Good stuff this. Slow down, it is worth the wait.
3. While you're waiting, be sure to reflect. Reflect out loud so we all can hear. Really I mean it. Our closed system of discourse needs to reflexively come clean regarding our politics, ethics, ways of knowing and other entanglements that occur in *all* research situations. Reflexivity acknowledges my vulnerability as an author and I like that, for I am tired of the smooth, shiny certainty found in our academic journals. Who are we kidding? The older I get the less certain I am about anything; though I'm darn sure I don't want to go it alone. As I begin to value and express my uncertainty and ignorance about where my research is going and what my findings mean, I have gained a spaciousness in which new possibilities can expand and grow.
4. We hold the power of legitimized knowledge production in academia; make something happen. Don't become complacent with your privilege. Jonesville School has leveraged my academic affiliation to gain district recognition, garner funding, attract media attention and deflect further scrutiny. Go ahead, you pick; there are hundreds untold stories out there waiting to be heard; grab the spotlight, then step out of the way.

Recommendations for Practice

1. School garden programs should include a dedicated volunteer outside of the school hierarchy to work with teachers and children in the garden. Teachers do not have the time to adequately manage the demands of a garden without additional help.
2. Coordinate school garden programs with Extension Service Master Gardener volunteers, academic service learning, or other volunteer mechanisms able to sustain the garden activities and maintenance.
3. Cultivate involvement with parents and families in the garden activities. A community garden holds great promise to develop and improve school to home connections, so important for learning.
4. Do not limit the possibility of the garden by tying it to curricular constraints and parameters. Each school setting will determine the local knowledge that can emerge from cultivating the earth and human connections.

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Teaching Biology Using Agriculture as the Context: Perceptions of High School Students

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Abstract

The purpose of this study was to determine how high school students perceived science and agriculture after completing a traditional yearlong biology class that used animal agriculture as the context. The specific research questions asked respondents their perceptions concerning the relationship between science and agriculture, their perceptions of agriculture in general, and their knowledge of agriculture after completing a traditional biology class that was taught using animal agriculture as the context.

This study utilized a case-study approach. The target population for the study included all students who participated in a biology course from the time animal agriculture was used as the context for teaching biology, from 1993 until 1999 (N=531). The raw mean scores for the statements regarding the respondents' perceptions of science and/or agriculture ranged from a low of 1.67, indicating their disagreement, for the statement "animals should not be used for meat" to a high score of 4.36 for the statement "I understand the need for people involved in animal agriculture to have a strong science background". Students in the traditional biology class that was taught using animal agriculture as the context rated 12 of the 16 statements (75%) between a 3.50 and 4.49 on a five-point Likert-type scale indicating they "agreed" with the statement.

Over 90% of the subjects reported that they either agreed or strongly agreed that participating in a biology class that used agriculture as the context helped them understand the relationship between science and agriculture. Over 85% of those responding agreed or strongly agreed that they not only appreciated the complex nature of animal agriculture as a result of taking the agricultural based biology class, but the biology class also helped them understand the practices used in animal agriculture. Almost nine out of ten respondents (88.6%) agreed or strongly agreed that they appreciated the importance of agriculture and appreciated those who work in agriculture as a result of participating in an agricultural based biology class.

Almost 90% disagreed or strongly disagreed with statements that animals should not be used for meat and that farmers raising animals are not concerned with the environment. Conversely, respondents felt very strongly about the people raising animals for human consumption. Four out of five (78%) strongly agreed or agreed that farmers care about their animals. Over 80% strongly agreed or agreed that raising animals for food and/or being a farmer is a noble profession.

Introduction/Theoretical Framework

Agricultural Education teachers have recently been encouraged to work at establishing methods for integrating more scientific principles into their agriculture curriculum. The concept of integrating science into agricultural education programs has been supported from various sources for almost two decades (A Nation at Risk, 1983; Understanding Agriculture: New Directions for Education, 1988; Secretary's Commission on Achieving Necessary Skills, 1991).

Research findings have supported the claim that integration of science into agriculture curricula is a more effective way to teach science. Studies conducted and duplicated support the findings that students taught by integrating agricultural and scientific principles demonstrated higher achievement than did students taught by traditional approaches (Enderlin & Osborne, 1992; Enderlin, Petrea, & Osborne, 1993; Roegge & Russell, 1990; and Whent & Leising, 1988). And, Osborne and Dyer (1998) discovered that "as a result curriculum redesign efforts in the 1990's in agricultural education have converged on identifying promising strategies that incorporate more science into high school agricultural curricula" (p. 8).

According to Science for All Americans (1989), a science literate person is one who 1) is familiar with the natural world, 2) understands the key concepts and principles of science, mathematics, and technology, 3) has a capacity for scientific ways of thinking, 4) is aware of some of the important ways in which mathematics, technology, and science depend upon one another, 5) knows that science, mathematics, and technology are human enterprises, and what that implies about their strengths and limitations, and 6) is able to use scientific knowledge and ways of thinking for personal and social purposes.

A contextual approach to scientific thinking is embedded in each of the above statements. To improve science literacy and students' understanding about the nature of science students must be challenged to think about science as something more than just sitting in the traditional science classroom. They need exposure to multiple opportunities for thinking scientifically, and multiple opportunities for applying scientific reasoning to everyday, complex problems.

Helping students understand the nature of science rather than what they know *about* science has been a recent focus of research in science. Devlin (1998) states "it is neither possible nor necessary for the general population to have detailed scientific knowledge across a range of disciplines. Instead, what is important is scientific awareness" (p. B6). The National Commission on Mathematics and Science Teaching for the 21st Century, referred to as the Glenn Commission, calls student performance in mathematics and science unacceptable (National Commission on Mathematics and Science, 2000). By approaching students with diverse interests in various disciplines with curriculum that supports formal science education, science could be relevant to those who are disengaged with traditional approaches to teaching science.

And, although recent science publications have espoused the attributes of integrating the science curricula, the level of integration referred to is almost always with *other* science courses (Scotter, Bybee & Dougherty, 2000; Steckelberg, et. al., 2000; Henriques, 2000). Limited evidence exists to support the concept that science teachers should look for ways to integrate more hands-on, applied science concepts into the science curricula. To date, the researcher could find no empirical evidence to suggest that science teachers have been advised to integrate agricultural science and/or food system concepts into their curricula in an attempt to make science come alive to their students. Likewise, no information could be found advising science teachers to initiate contact with other teachers in an effort to collaborate with teachers of similar content.

The experiential learning model provides the theoretical basis for this project. According to Dewey (1938), education is not a single step in a moment of time but rather a series of overlapping events that serve to help the learner construct meaning in much more than just the subject matter being presented. Dewey (1938) states:

> "Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time. Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important...For these attitudes are fundamentally what count in the future. The most important attitude that can be formed is that of desire to go on learning. If impetus in this direction is weakened instead of being intensified, something much more than mere lack of preparation takes place" (p. 49-50).

Further evidence for providing students with multiple contexts is found in brain-based research and learning by Caine and Caine (1994) who call for education to recognize the big picture. They add "the part is always embedded in a whole, the fact is always embedded in multiple contexts, and a subject is always related to many other issues and subjects" (p. 7). Therefore, brain-based theory and the experiential learning theory suggest that the interface between context and content provide students with multiple opportunities for transfer and overlap of complimentary concepts.

In 1993, a biology teacher in a large high school in the Midwest began teaching a traditional biology course using agricultural science as the context for scientific principles. The biology teacher's training includes a Bachelor of Science in Agricultural Education. However, the teacher did not enter the Agricultural Science and Business teaching field, but instead chose to teach traditional science for the past 31 years. The motivation for teaching biology using a yearlong thematic approach centered around the teacher's desire to expose students to concepts of where food originates. No classes in Agricultural Science and Business are taught in this high school, or the entire school district.

The teacher created a series of instructional units, field trips, laboratory activities, and guest speakers focused on a specific farm animal for each year. Alternating between poultry, swine, and dairy cows, the teacher taught traditional biology using the animal agriculture context for six years. Many of the students who live in the 60,000+ community had never experienced, first-hand, animal agriculture and never considered the scientific understanding necessary to be involved in animal agriculture.

Purpose and Objectives

The purpose of this study was to determine how high school students perceived science and agriculture after completing a traditional yearlong biology class that used animal agriculture as the context. Agricultural Science and Business teachers should benefit from this knowledge through a greater understanding of the importance of linking agriculture and science instruction. This knowledge should also be helpful to science teachers interested in developing approaches that increase interest in science and improve the relevance of science in their classrooms. To fulfill the purposes of the study, the following research questions were addressed:

1. What are selected demographic variables of students completing a traditional biology class that was taught using animal agriculture as the context?

2. What are the perceptions of students concerning the relationship between science and agriculture after completing a traditional biology class that was taught using animal agriculture as the context?

3. What are student perceptions of agriculture after completing a traditional biology class that was taught using animal agriculture as the context?

4. What level of knowledge about agriculture did students of a traditional biology class retain after completing the course?

Procedures

This study utilizes a case-study approach. Gall, Borg, and Gall (1996) state that "[a] case study is done to shed light on a phenomenon, which is the processes, events, persons, or things of interest. Examples of phenomena are programs, curricula, roles, and events" (p. 545). The school involved in the study changed to a trimester schedule during the early phase of the investigation. The new schedule did not allow for the continuation of the biology course under investigation and therefore the target population for this study was limited to the completers of a traditional high school biology class that used animal agriculture as the context for teaching science. The high school involved in this study has a population of over 2,000 students and does not offer Agricultural Science and Business courses. The target population for the study included all students who participated in the biology course from the time agriculture science was used as the context for teaching biology, from 1993 until 1999 (N=531). The biology teacher provided the researcher with a database containing the names and home addresses of all students. Although this study provides findings that address the specific research questions involved, the population and scope of the study are too limited to generalize beyond the original school involved.

A survey instrument developed by the researcher was used to identify the perceptions of the completers of the biology course. Input on face and content validity was gathered from agricultural education professors. Construct validity was established by the high school teacher involved in teaching the biology course. The survey instrument was developed in conjunction with guidelines provided by the Institutional Review Board for governing research conducted using human subjects by the institution employing the researcher. Permission to gather data from students and past high school graduates was granted by the administration of the high school as well.

The survey instrument, cover letter, and parent release form were mailed to the home of the subjects in June 2000. Subjects were instructed to return the survey instrument by mail to the high school office, or to hand carry the instrument and deliver it to the main office of the high school. Two weeks after the initial mailing, a follow-up letter was sent to all non-respondents. Four weeks after the initial mailing a second survey instrument and cover letter was sent to all subjects who had not responded, with a follow-up reminder letter coming 2 weeks after that. The population included students who had taken the biology course up to six years prior to the study. As a result, some addresses for students were not current and survey packets were returned to the researcher undeliverable as indicated by the post office. After subtracting 75 subjects who were unable to be contacted, the researcher received 311 useable responses for a response rate of 68%. Data were analyzed and summarized using frequencies, means, and standard deviations.

For reporting purposes the author determined, a priori, that aggregate mean responses for Likert type statements would be grouped into categories to aid in interpretation. Responses equivalent to 4.50 or greater were categorized as "strongly agree." Responses ranging from 3.50 to 4.49 were categorized as "agree", and those with mean scores ranging from 2.50-3.49 were categorized as "unsure." Responses ranging from 1.50 to 2.49 were categorized as "disagree", while those responses receiving mean scores lower than 1.50 were categorized as "strongly disagree."

Results

Students who participated in the biology class that was taught using agriculture as the context were exposed to one of three different yearlong themes. During the school years of 1993-94 and 1996-97 biology students were taught with the theme "Swine Time", an emphasis on the nature of swine. During the school years of 1994-95 and 1997-98 students were taught with an emphasis on dairy animals called "Dairy Daze". And, in 1995-96 and 1998-99 students received instruction centered on poultry in a thematic approach called "Poultry Power". In each theme throughout each school year, students were exposed to traditional biology principles through an animal agriculture context.

Research question one sought to determine selected demographic variables of the students who participated in the traditional biology class that was taught using animal agriculture as the context. Student responding to the study reported 30.2% had experienced Dairy Daze, 28.2% had experienced Swine Time, and the remaining 41.6% had been exposed to the Poultry Power theme. Of the students reporting, 97.7% were high school freshman participating in their first high school science class. When asked about the grade they received in the class 40.0% reported receiving an "A", while 41.0% reported receiving a grade of "B". The mean overall high school Grade Point Average of the respondents was 3.46 (out of a possible 4.00 Grade Index). Approximately 60% were females, and over nine out of 10 reported they were Caucasian. When asked for background information that might connect them to agriculture, less than three percent indicated they lived on a farm, and less than one in five (18%) reported they had been in 4-H. Table 1 highlights additional demographic information of the respondents.

In addition to questions used to gather demographic information of the respondents, the subjects were asked to respond to 22 statements regarding their perceptions of science, their perceptions of agriculture, and their knowledge of agriculture as a result of taking the modified biology class. Their responses were measured using a five point Likert-type scale where 1=strongly disagree, 2=disagree, 3=unsure, 4=agree, and 5=strongly agree.

Table 1

Descriptive Statistics for Selected Demographic Characteristics of Students Enrolled in a Traditional Biology Class Taught Using Agriculture as the Context (n=311)

Characteristic		Percentage
Grade received for Biology class using agriculture as the context:	A	40.0
	B	41.0
	C	3.5
	D	2.3
	Unsure	13.2
Gender:	Female	58.9
	Male	41.1
Ethnicity:	African American	2.6
	American Indian	0.6
	Asian American	2.3
	Caucasian	92.9
	Hispanic	0.6
	Multiracial	1.0
Location of Residence:	Farm	2.6
	Rural Area	27.2
	Urban/City	70.1
Member of 4-H:	Yes	17.5
	No	82.5
Relatives that live/work on a farm:	Yes	37.4
	No	62.6
Grades received in all science classes:	All A's	25.6
	A's and B's	64.7
	B's and C's	9.1
	C's and D's	0.6
As a result of taking a biology class using agriculture as the context my *interest* in food systems and agriculture is:	High	5.2
	Moderately High	23.3
	Moderate	51.1
	Moderately Low	12.0
	Low	8.4

The raw mean scores for the statements regarding the respondents' perceptions of science and/or agriculture ranged from a low of 1.67, indicating their disagreement, for the statement "animals should not be used for meat" to a high score of 4.36 for the statement "I understand the need for people involved in animal agriculture to have a strong science background". Overall, none of the statements received an aggregate mean score of 4.50 or higher. Students in the traditional biology class that was taught using animal agriculture as the context rated 12 of the 16 statements (75%) between a 3.50 and 4.49 on a five-point Likert-type scale indicating they "agreed" with the statement. One statement (6%) was rated between 2.50 and 3.49 on the five-point scale indicating respondents were "unsure" of their perception of the statement. The remaining three statements (19%) were rated with scores between 1.50 and 2.49 indicating respondents were in disagreement with the contents of the statement. None of the 16 Likert-type statements received an aggregate mean score below 1.67.

To address research question two the subjects were asked to respond to statements concerning the relationship between science and agriculture. Table 2 shows the results from six questions used to determine respondent attitudes towards this concept. Using the same Likert-type scale, scores in this section ranged from 4.36 to 4.20, indicating the respondents "agreed" with each question concerning the relationship between science and agriculture.

Table 2

Perceptions of High School Students Regarding the Relationship Between Science and Agriculture After Taking a Biology Course Using Animal Agriculture As the Context ($n = 311$)

Item Statement *As a result of taking a biology course that emphasized animal agriculture I:*	Mean	SD
Understand the need for people involved in animal agriculture to have a strong science background.	4.36	0.78
Understand the relationship of science with agriculture more than I did before.	4.35	0.77
Appreciate those who work in agriculture more than I did before.	4.34	0.82
Understand the practices of animal agriculture more than I did before.	4.30	0.87
Appreciate the importance of agriculture more than I did before.	4.20	0.85
Appreciate the complex nature of animal agriculture more than I did before.	4.20	0.78

Research question three asked former students about their perceptions concerning agriculture in general. Ten questions were used to gain student perceptions in this section. Table 3 shows the results from the questions used to determine respondent attitudes towards this concept. Scores in this section ranged from 1.67 to 4.31. Respondents indicated they agreed with the statement "people who raise animals for food need to know a great deal about science in order to do their job effectively" (4.31). Table 3 highlights the results from the ten questions used to determine respondent attitudes towards this concept.

Research question four asked students who were taught biology using agriculture as a thematic approach about their knowledge of specific agriculture as a result of participating in the biology course. Six statements were included in this section which referenced material covered during

Table 3

Perceptions of High School Students Toward Agriculture in General After Taking a Biology Course Using Agriculture As the Context ($n = 311$)

Item Statement	Mean	SD
People who raise animals for food need to know a great deal about science in order to do their job effectively.	4.31	0.83
Farmers care about their animals.	4.07	0.79
Raising animals for food and/or being a farmer is a noble profession.	4.07	0.83
All students should have knowledge about food systems and animal agriculture.	3.88	0.84
Animal agriculture and food production is all about science.	3.75	0.87
Exciting careers exist in agriculture.	3.67	0.89
Generally speaking, farming is a lucrative occupation.	2.93	0.97
Farmers do not treat their animals humanely.	2.05	0.90
Farmers raising animals are not concerned with the environment.	1.75	0.91
Animals should not be used for meat.	1.67	0.91

the yearlong biology class. Students were asked general agriculture and general animal science questions that were part of the instruction offered to each biology class regardless of the animal species used for the particular year. Questions utilized a multiple-choice format, and answers were coded as either correct or incorrect for tabulation purposes. No attempt was made to categorize incorrect answers or to draw conclusions from the results of incorrect responses. Table 4 gives detailed information concerning the responses of students to the questions in this category. The correct answers given to the six questions ranged from 92% of the respondents correctly identifying the role of vaccines in animal health to a low response of seven percent for correctly identifying the approximate percentage of disposable income American's spend on food each year.

Conclusions

The conclusions of this study were based on the responses of students enrolled in a traditional biology course that was taught using agriculture as the context for teaching science. Students who were enrolled in the course were taught one of three yearlong units specializing in animal agriculture. Although other studies focus on the impact of using agriculture to teach science, caution must be exercised when generalizing the results beyond the population of this study.

Table 4

High School Students' Knowledge of Agriculture After Taking a Biology Course Using Animal Agriculture As the Context (n = 311)

Item Question		Percentage
Animals can be made artificially immune to certain diseases with the use of which of the following?	Correct	91.8
	Incorrect	8.2
_______ is sometimes placed in animal feeds to fight bacteria?	Correct	77.6
	Incorrect	22.4
_____ is the number one livestock industry in the United States?	Correct	54.4
	Incorrect	45.6
What is an advantage to crossing two purebred animals in order to obtain a crossbred?	Correct	47.8
	Incorrect	52.2
Approximately what percentage of all jobs in the United States are related to the food and fiber system?	Correct	24.4
	Incorrect	74.6
Approximately what percentage of disposable income is spent on food in the United States?	Correct	6.7
	Incorrect	93.3

From the data it was concluded that the majority of the respondents did well in the biology class, receiving either an "A" or "B" for the course. In general, over 90% of the students reported receiving "A's and B's" in all of their science courses. By evidence of their relatively high Grade Index (3.46 out of a possible 4.00) it can be concluded that the respondents took their science classes and their schoolwork seriously. Based on the responses of the subjects to questions regarding previous involvement with agriculture and/or involvement in agricultural youth organizations such as 4-H, no evidence appeared to indicate they were predisposed to a sympathetic viewpoint toward agriculture. Over 70% reported living in an urban or city setting, over 65% did not have a relative who lived or worked on a farm and four out of five were never involved in 4-H. Furthermore, no classes in Agricultural Science and Business were offered anywhere in the city's consolidated school corporation indicating there was no chance to be involved in the National FFA Organization as well. However, as a result of receiving instruction in biology using agriculture as the context, 80% of respondents indicated they now have a moderate to high level of interest in food systems and animal agriculture as a result of taking this class.

Research question two sought to determine the perceptions of respondents toward the relationship between science and agriculture. Based upon a Likert-type scale, over 90% of the subjects reported that they either agreed or strongly agreed that participating in a biology class that used agriculture as the context helped them understand the relationship between science and agriculture. This concurs with the findings of Caine and Caine and supports the work being done in brain-based theory. Over 85% of those responding agreed or strongly agreed that they not only appreciated the complex nature of animal agriculture as a result of taking the agricultural based biology class, but the biology class also helped them understand the practices used in animal agriculture. It can be concluded that students gained a better understanding of the role that science plays in the world of animal agriculture as a result of taking a biology course that taught science using animal agriculture as the context.

Almost nine out of ten respondents (88.6%) agreed or strongly agreed that they appreciated the importance of agriculture and appreciated those who work in agriculture as a result of participating in an agricultural based biology class. This response indicates that the teacher was successful in communicating the link between science and the world of agriculture. As a result of taking the biology class using agriculture as the context, respondents indicated that they understood the need for farmers to have a strong science background.

Research question three looked to determine the perceptions of the respondents toward animal agriculture in general. Almost 90% (86% and 87% respectively) disagreed or strongly disagreed with statements that animals should not be used for meat and that farmers raising animals are not concerned with the environment. Conversely, respondents felt very strongly about the people raising animals for human consumption. Four out of five (78%) strongly agreed or agreed that farmers care about their animals. Over 80% strongly agreed or agreed that raising animals for food and/or being a farmer is a noble profession. This indicates a positive perception and attitude toward the people involved in animal agriculture. It can be concluded that students of the modified biology class realize the need for animal agriculture and feel that farmers treat their animals humanely. Furthermore, since a large majority of the respondents reported living in a city or urban setting with limited exposure to animal agricultural production, many have positive perceptions about farmers and farming, with some maintaining these attitudes for up to five years. It can be concluded that subject matter taught in the context of animal agriculture, from a teacher experienced in modern animal agricultural practices, can have a positive effect upon student attitudes towards agriculture and those who work in the agriculture industry, even when taught within a school corporation located in a larger metropolitan city.

Assessing respondents' knowledge of agriculture and retention of that knowledge was the purpose of research question four. Students were asked questions concerning elements of animal agriculture, and agriculture in general, that were included in the instruction of all three themes, poultry, swine, and dairy. Of the questions asked respondents were able to correctly determine (92% correctly responded) that vaccines were helpful to an animal's immune system for fighting disease. Subjects were also successful in determining the number one livestock industry in the United States and the purpose that antibiotics serve in animal production and animal health. However, slightly less than half (48%) of the respondents knew the advantage of crossbreeding two purebred animals. In addition, subjects did poorest in questions regarding the percentage of disposable income that American's spend for food, and the percentage of jobs in the United States that are related to the food and fiber system. It can be concluded that the former students of the biology class using animal agriculture as the context could transfer general information regarding health to related subject matter in animal health as taught during the class. Some could transfer this information very well. The teacher is to be commended on the achievement of these students. However, broad ideas concerning the scope and importance of the food and fiber system within the United States were much more difficult for students to recall. This implies that although animal agriculture was the theme for each of the six years of this biology class, it was still a biology class. Scientific principles were the main focus regardless of the context, and broad themes regarding the agricultural industry may not have received adequate attention.

Recommendations

The teacher responsible for teaching the biology course in this study was a graduate of a four-year teacher education program in Agricultural Education. In addition, he actively farmed with his family during the first 20 years of his teaching career. He did not teach Agricultural Science and Business but went directly into the science classroom. As a result he had a tremendous background and interest in agriculture and communicating that knowledge to his students. It is recommended that further research examine the relationship between the teacher's education and background and their ability to successfully utilize a thematic approach focusing on agriculture. Specifically, how much pre-service and in-service training is necessary for non-agriculture teachers to effectively utilize agricultural education in their classroom?

Agricultural Education is facing a shortage of qualified teachers today. As a result, it is recommended that Agricultural Education Teacher Preparation Programs explore the feasibility of offering courses of study for those pre-service teaching majors in programs that align closely with agriculture, specifically the sciences. Although this will not directly help the shortage of traditional Agricultural Science and Business teachers, it may begin to influence the agricultural literacy of students who would not traditionally have the opportunity to participate in an Agricultural Science and Business program such as the one used in this study.

Many Agricultural Science and Business programs have recently begun to implement scientific principles into their existing curriculum (Osborne & Dyer, 1998). However, no evidence exists for the number of traditional science programs that utilize some form of instruction in food, agriculture, and/or natural resource systems. It is recommended that data be collected from school corporation science departments to determine the extent, if any, that these topics are being taught. It is possible that more agriculture and/or natural resource systems education is already occurring in local science departments than is currently known.

Finally, the teacher responsible for teaching the biology course in this study secured funding for the various activities included in the course from a local Farm Bureau county affiliate. It is recommended that funding be made available for teachers interested in using agriculture as the context for teaching traditional science courses. Local Farm Bureau affiliates, commodity groups, and agricultural based corporations should be made aware of the opportunities available to support teachers and students interested in advancing agricultural literacy through science and agricultural science partnerships.

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The Influence of Foundational and Expressed Values on Teacher Behavior

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Abstract

Although there is general agreement on the need for teaching values in the American high schools, there is no consensus on the values to be taught. The purpose of this study was to examine the relationship between selected personal and school characteristics on the value system of educators and to determine if value systems and personal and school characteristics contribute to teacher behavior. To accomplish this goal, the following objectives were developed: (1) explore the influence of selected personal and school characteristics on foundational values; (2) explore the influence of selected personal and school characteristics on expressed values; (3) describe the relationship of selected personal and school characteristics, foundational values, and expressed values on teacher behavior.

Two hundred agricultural education teachers were sampled nationwide. The sample was proportional and stratified by state. One hundred forty-one teachers responded to the survey for a return rate of 70.5%. Factor analysis was performed and resulted in the two derived variables of foundational and expressed values. Multiple regression analysis was then performed on selected personal and school characteristics and the derived variables. An additional regression was performed on teacher behavior using selected personal and school characteristics, foundational, and expressed values.

A significant amount of variance in expressed values was explained by a linear combination of personal and school characteristics. Respondents who had a higher number of students in their agriculture courses tended to have a higher level of agreement that there was a need to teach expressed values. Additionally, a significant amount of variance in teacher behavior was explained by a linear combination of foundational and expressed values along with selected personal and school characteristics. Respondents who held stronger levels of agreement toward expressed values tended to exhibit more positive teacher behaviors. Since the personal and school characteristics influence teacher behavior in the classroom, efforts should be made to incorporate value system education into pre-service and in-service educational programs.

Introduction/Theoretical Framework

Over 90% of Americans believe there is a significant "moral decline" in our country (Gough, 1998). In a recent poll of adult Americans conducted by *The Wall Street Journal* (1998), "moral decline" was cited as the biggest problem America faces in the next twenty years. Fortunately, this decline is not going unnoticed. According to Nussel (1994), almost all societal problems can be reduced to the failure to do something, and people make mistakes as a result of inaccurate information or a lack of information. Since the school transmits knowledge, skills and values regarded as critical within the society, it can be held accountable when problems arise (Nussel, 1994). Great strides are being made in incorporating moral education into the whole school environment, including the agricultural education curriculum. However, the instruction of value education is of yet not clearly defined in the current American educational system.

Educators have realized for some time that what a student accomplishes depends on his/her attitude, philosophy and value judgments. According to Pullias and Lockhart (1963) educators must recognize that students possess value systems which influences the teaching/learning process, which in turn provides feedback to their individual system. It is part of the learning process to help students develop and utilize their individual system. However, students are not the only ones to posses a value system. The teachers' behavior in the school setting is largely based on their personal characteristics and the school characteristics. The model of the effects of personal characteristics and school characteristics on teacher behavior depicts factors that affect teachers' behavior in the school setting (Figure 1). The personal characteristics sphere is a modification of Fessler's Teacher Career Cycle Model (Burden, 1990) in which he describes how personal environment and organizational environment influence the career cycle.

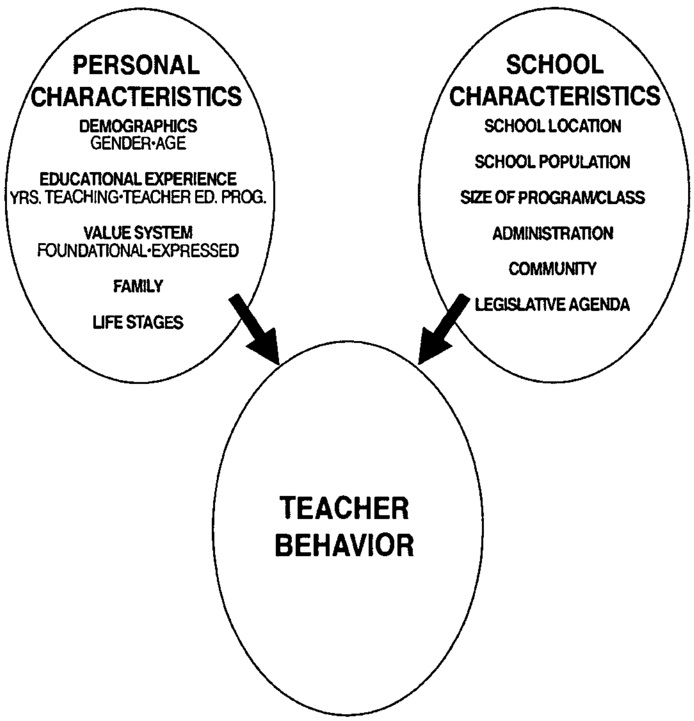

Figure 1. Effects of personal characteristics and school characteristics on teacher behavior.

In the teacher behavior model, school characteristics refer to those attributes that affect the overall climate of the school and consequently influence teacher behavior. Fessler refers to these loosely as management style, societal expectations, regulations and public trust (Burden, 1990). Examples of school characteristics include: school location, school population, size of program/class, administration, community, and legislative agenda. Personal characteristics include demographics of the teacher (gender and age); educational experience factors refer to the number of years teaching (specifically the number of years teaching agriculture) and the teacher education program that prepared them for their program experience. Family and life stages refer to the personal traits of the teachers. The value system, or more specifically the foundational and expressed values, refer to the character of the teacher. According to Phipps and Osborne (1988), teachers of agriculture must possess unquestionable character as it is essential to be a successful teacher.

In the foundational and expressed values model (Figure 2), values that are defined as foundational are those values a person must develop before other values can be expressed. For example a person must have a foundation of courtesy before it can be expressed as respect and tolerance; honesty is the foundation for truth; the expressions of commitment, self-respect and service must first have the foundation of honor. The foundation values do have some overlap when they are expressed. For example kindness can be expressed as caring, and generosity can be expressed with service (an overlap with honor), caring (overlap with kindness) and friendship (an overlap with loyalty.) The foundational value of loyalty is expressed as friendship and trust, while diligence, prudence and responsibility express the foundation value of perseverance.

The authors propose that there is a time dimension to the development of a value system. A noted values and morals theorist, Kohlberg (1973) illustrates the characteristics of personal development stages as first described by Piaget. One characteristic is that stages imply distinct or qualitative differences in structures (modes of thinking) that perform the same function at various points in development. Therefore the researchers contend that in order to exhibit the expressed value, a person must first have developed the foundational value and in time will express it accordingly.

Purpose and Objectives

The purpose of this study was to examine the relationship between personal and school characteristics on the value system of educators and to determine if value systems and personal and school characteristics contribute to teacher behavior. As a means of accomplishing the purpose, the following objectives were developed:

1. Explore the influence of selected personal and school characteristics on foundational values.

2. Explore the influence of selected personal and school characteristics on expressed values.

3. Describe the relationship of selected personal and school characteristics, foundational values, and expressed values on teacher behavior.

Methodology

Population/Study Design

The current study was a part of a larger study that sought to determine perceptions of agricultural education teachers nationwide as to what values should be taught to students enrolled in high school agriscience courses, and identify if differences exist in perceptions of the

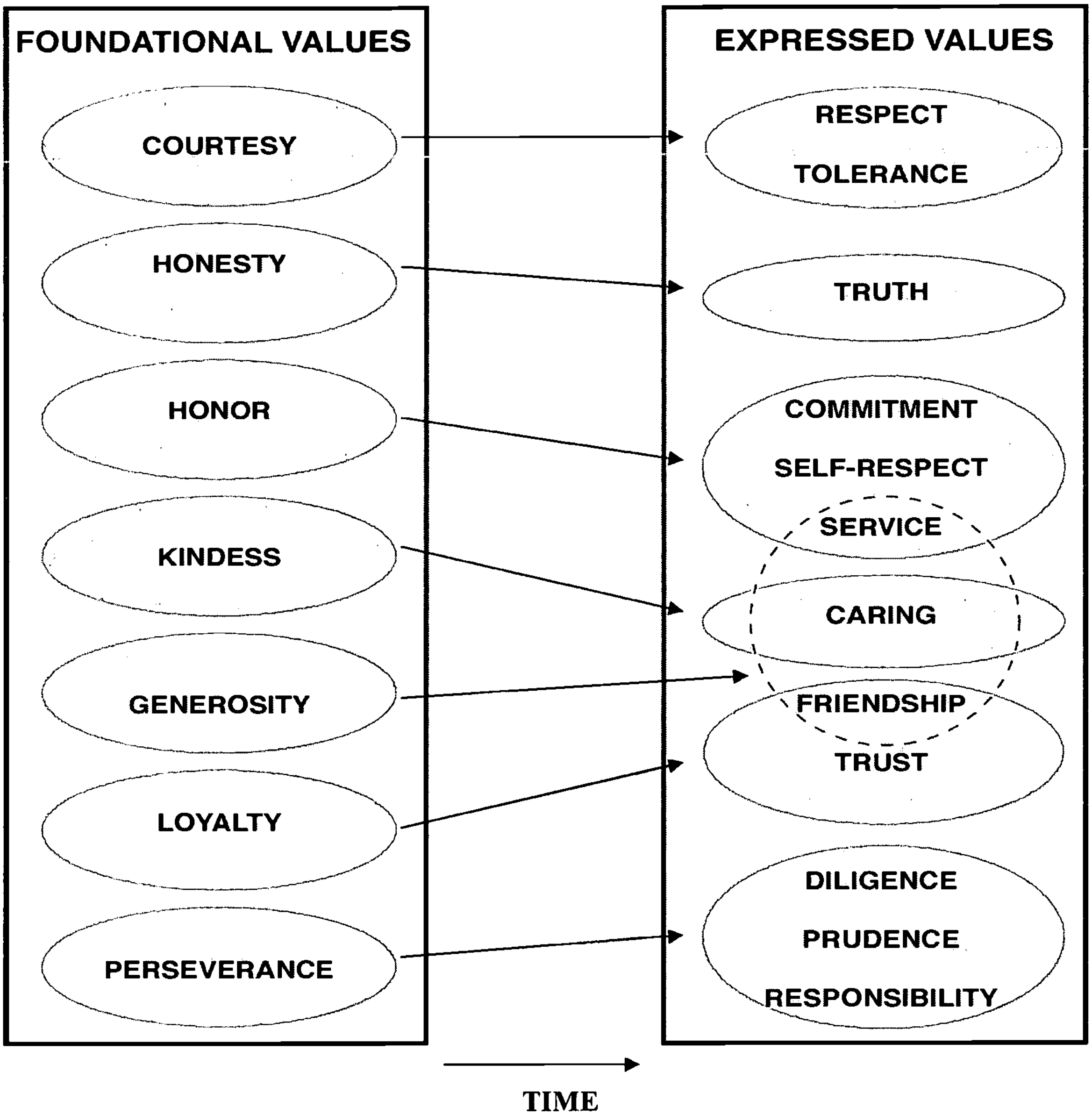

Figure 2. Foundational and expressed values model

teachers. The target population of this study was all agricultural teachers who taught in public secondary schools in the United States during the 1997-98 school year. In 1996, there were pproximately 10,250 agricultural education teachers in the 50 states and government territories where agriscience courses were offered (National FFA Association, 1997). The list of individuals in the target population was taken from the Agricultural Educators Directory (Henry, 1997). By using a formula for estimating sample size (Cochran, 1977; & Dillman, 1978) it was determined that a sample size of 175 was sufficient. Over-sampling was used because past national surveys of agricultural education teachers have shown low response rate. A total of 200 names were selected using techniques described by Borg and Gall (1994). The sample was proportional and stratified by state. One hundred forty-one teachers responded to the survey for a return rate of 70.5%.

Instrumentation

To control for nonresponse error, major portions of the Total Design Method (TDM) developed by Dillman (1978) were adopted. Modifications to the design were made to meet mailing requirements. The instrument for the study was a three-part, mailed questionnaire. It was researcher-designed and composed in a booklet format according to the TDM. Part One was used to gather demographic information from the subjects. Part Two consisted of a two-column, five-point Likert-type scale using questions to determine which values should be taught in the agriscience curriculum as suggested by an extensive literature review (Berg, 1996; Carnegie Council on Adolescent Development, 1996; Character Education Curriculum [Brochure]; Hague, 1993; Heaven, 1992; Kahle, 1983; Lewis, 1990; Licona, 1991; Noyd & Richardson, 1996; Pullias & Lockhart, 1963; Rokeach, 1970; Unell & Wyckoff, 1995) and which component of the curriculum (classroom, laboratory, FFA, or Supervised Agricultural Experience program) would be the best vehicle of instruction. Part Three was designed by the researcher to collect implicit information about teacher behavior.

After development, the instrument was presented to a panel of agricultural educators for review. The review was used to verify the validity of the instrument's content. A pilot test was also conducted using a group of 20 agriscience instructors who participated in a cooperating teacher conference sponsored by an agricultural education department.

Data collected from the two rounds of testing were analyzed using SPSS 10.0.7. Relationships between the first and second measures were used to determine a coefficient of stability for the instrument. Coefficients ranged from .90 to 1.0 for each of the questions/statements.

In an effort to establish unidimensionality of the constructs, factor analysis was conducted. For the analysis of this instrument, the maximum likelihood method of analysis was used. The suitability of the data set for exploratory factor analysis was examined. Correlations among the items, the correlation matrix, the Kaiser-Meyer-Olkin (KMO) statistic, and the measure of sampling adequacy were examined. The results of factor analysis was two derived variables (Foundational Values and Expressed Values) accounting for almost 50% of the variance in the respondents' perceptions towards what values should be taught to students enrolled in high school agriscience courses.

A third section was also entitled "Teacher Behavior." Data reduction was conducted for this section resulting in the removal of three components due to loadings below .4. Based on factor analysis, a grand mean was calculated for all three sections for the purpose of analysis. To determine teacher behaviors, agricultural science teachers were asked to respond to scenario statements using a Likert-type scale. Examples of the statements are "I always strive to give accurate information;" "I consciously keep confidential matters told to me by a co-worker to myself;" "When working with students and co-workers, I keep my temper under control;" "I can list numerous examples where I have 'gone the extra mile' to help students;" "I consciously incorporate the teaching of values and morals into the agri-science curriculum;" and "I try to see the other side of situations in which I find myself."

Using Cronbach's coefficient alpha, reliability was assessed. Reliability of foundational values was r = .93 and expressed values was r = .89. Reliability for the teacher behaviors was r = .73.

Results

Objective One

To determine the amount of variance explained by personal and school characteristics in the foundational values, a multiple regression analysis was performed at the .05 level of significance (Table 1). The dependent variable for the regression was the foundational values as perceived by agricultural science teachers. The selected independent variables were the personal and school characteristics of the respondents' gender, number of years they have taught agriculture, and number of students enrolled in agriculture courses.

Table 1

Regression On Foundational Values

Variables	Mean	S.D.	b	t	p
Gender	1.13	1.43	-.028	-.23	.818
Number of students in agriculture courses	157.46	167.49	.267	2.397	.018
Number of years teaching agriculture	16.46	16.83	-.141	-1.216	.226
(Constant)				66.90	<.001

N = 138, F = 2.135, p = .099, R^2 = .046, Standard error = .5449

A linear combination of gender, number of years teaching and number of students enrolled in agriculture courses explains five percent of the variance in foundational values but was not found to be significant (R^2 = .046, F = 2.135, p = .099).

Objective Two

A multiple regression analysis was performed at the .05 level of significance to determine the amount of variance explained by the personal and school characteristics in the expressed values (Table 2). The dependent variable for the regression was the expressed values as perceived by agricultural science teachers. The independent variables were the personal and school variables of gender, number of years teaching agriculture and number of students enrolled in agriculture courses.

Approximately 12% (R^2 = .117, F = 5.934, p = .001)) of the variance on expressed values was attributed to the combined independent variables. As reported, a significant amount of variance in expressed values was explained by a linear combination of gender, number of

Table 2

Regression On Expressed Values

Variables	Mean	S.D.	b	t	p
Gender	1.13	1.43	-.160	-1.365	.175
Number of students in agriculture courses	157.46	167.49	.427	3.981	<.001
Number of years teaching agriculture	16.46	16.83	-.023	-.209	.835
(Constant)				98.915	<.001

N = 138, F = 5.934, p = .001, R^2 = .117, Standard error = .3611

students in agriculture courses, and number of years teaching agriculture. The most meaningful independent variable was number of students in agriculture courses. Respondents who had more students in their agriculture courses tended to have a higher level of agreement with the need to teach expressed values (b = .427, t = 3.981, p = <.001).

Objective Three

In determining the amount of variance that personal and school characteristics, foundational values, and expressed values explained in overall teacher behavior, a multiple regression analysis was performed at the .05 level of significance (Table 3). The dependent variable for the regression was teacher behavior. The selected independent variables used for the multiple regression included the personal and school characteristics of gender, number of years teaching agriculture and number of students in agriculture courses, as well as factor scores for foundational values and expressed values.

Table 3

Regression On Teacher Behavior

Variables	Mean	S.D.	b	t	p
Gender	1.13	1.43	-.136	-1.23	.221
Number of students in agriculture courses	157.46	167.49	.044	.417	.678
Number of years teaching agriculture	16.46	16.83	.072	.684	.495
Foundational Values	4.64	.552	-.006	-.059	.953
Expressed Values	4.59	.38	.475	4.54	<.001
(Constant)				7.48	<.001

N = 138, F = 8.33, p = <.001, R^2 = .240, Standard error = .306

Twenty-four percent (R^2 = .240, F = 8.33, p = <.001) of the variance in teacher behavior was explained by a linear combination of foundational and expressed values along with gender, number of years teaching agriculture and number of students in agriculture courses. The most meaningful independent variable was expressed values. Respondents who held stronger levels of agreement toward expressed values tended to exhibit more positive teacher behaviors (b = .475, t = 4.54, p <.001).

Conclusions and Recommendations

The personal and school characteristics included in the initial model did not contribute significantly to the teachers' perceived importance of foundational values. This finding will enable state staff members, school district administrators, and curriculum development specialists to prepare instructional programs on the importance of foundational values without tailoring such programs based upon teacher gender, student enrollment, and years of teaching experience. However, the question remains, are there explanatory variables that exist that explain foundational values? Clearly some would argue that as adults regardless of teacher background, there would be almost widespread agreement among the importance of foundational values such as honesty, courtesy, honor, kindness, generosity, loyalty, and perseverance. This current study certainly substantiates such a claim.

When exploring the influence of the same set of personal and school characteristics on perceived importance of expression values upon the teachers' perceived importance of expression values, a statistically significant relationship was discovered. Although neither of the personal characteristics was practically meaningful, the lone school characteristic was found to be statistically meaningful. Teachers with larger enrollments tended to view expressional values as being more important. One plausible explanation regarding this finding is that larger enrollments are found in urban or suburban areas or in small cities – and they are typically plagued with more social problems, compared to their rural school counterparts. It is likely that urban, suburban, and large city residents receive more influence from the mass media. O'Connor (Performax Systems International, 1985) proposed that culture is a key variable in determining one's value system. It is therefore recommended that in agricultural education, statewide or national curricular initiatives focus on larger school districts and their students' particular needs, which may differ from the needs and/or concerns of smaller school students.

This study showed that the combination of personal and school characteristics had a significant influence upon positive teacher behaviors. Teacher perceptions of expression values were the single most important factor included in this explanatory model. This provides solid evidence that this personal characteristic plays an essential role in a teacher's behavior. Agricultural education faculty need to make preservice teachers cognitively conscious that the higher one values acting upon the foundational values, the greater the likelihood that an individual will exhibit positive teacher behaviors.

Although not certain, it stands to reason that teachers who more highly value expressed values are more likely to actually practice those behaviors, and are consequently more effective teachers. If so, is this because they treat their students with more dignity and respect than others? This would clearly indicate the importance of teaching in the affective domain. In conclusion, like in most studies the authors' conclude that more research on these complex constructs is needed. Future researchers should consider other factors which may influence positive teacher behaviors in order to add to the foundational theory in teaching and learning.

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Women In Agricultural Education: Who Are You?

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Abstract

In a traditionally male dominated field, like agricultural education, artificial barriers based on attitudinal bias often prevent qualified women from reaching their potential. Due to the late entrance of women into this field, there are very few role models for young women entering the profession. This descriptive study was designed to create a demographic profile of the women in secondary and middle school level agricultural education across the United States.

Although the women surveyed reported high levels of satisfaction in their profession, the actual ratio of women to men is still quite low (1:6). The large percentage of women that felt they had experienced some barriers due to their gender may provide some explanation for this discrepancy. Acceptance by peers, community and administrators combined with the challenge of balancing family and career appear to be areas of concern for these women.

Introduction

"The term the 'glass ceiling' first came into use in 1986, when two *Wall Street Journal* reporters coined the phrase to describe the invisible barrier that blocks women from the top jobs" (Catalyst Report, 1993). Research on the advancement of women in the professions points to many of the same glass ceiling phenomena cited in business, but also includes some unique issues. Artificial barriers based on attitudinal bias often prevent qualified women from reaching their potential (Catalyst Report, 1993). The glass ceiling phenomena may also pervade agricultural education. Due to the late entrance of women into this field, there are very few role models for women who aspire to teach agricultural education. The evolution of women in the field of agricultural education is not well documented.

P. W. Kaufman's 19th century chronicle, Women Teachers on the Frontier (1984), provides a unique insight into society's vision for women in education. At mid-century, town officials in Concord, Massachusetts, found that pupils under women teachers improved more than those taught by men.

> And surely, this being the fact,' the town stated, 'it is not good economy to employ a man to teach those schools, when the services of a woman, of the best qualifications, can be obtained for two-thirds or three-fourths the expense (Kaufman, 1984, p. xxi).

Women's struggle for equality in the job place was still in its infancy in 1855. As women's roles as educators became more widely accepted, concepts about education were also changing. The young American economy revolved around agriculture and legislators recognized the need for the advancement of agriculturists through education. That need was initially addressed with the passage of the Morrill Act of 1862, which established the university land-grant system. In 1917, Congress passed the National Vocational Education Act. This act, known as the Smith-Hughes Act, provided for the establishment of vocational agriculture classes in secondary schools. The National FFA Organization was established in 1928 as a club for male students enrolled in vocational agriculture. The vocational agriculture arena changed in 1969 when the National FFA voted to allow girls to become members (Official FFA Manual, 2000-2001). As female enrollment in vocational agriculture classes increased, the need for female agricultural education teachers surfaced and male teachers became uncomfortable in dealing with certain female issues and serving as chaperones for mixed groups of students on overnight trips (B. Milford and B. Winters, personal communication, April 1982).

According to a 1987 study by Knight, on a national level, women only held 5.1 % of secondary agricultural education positions. In a more recent study (Camp, 1988) that percentage rose to 15.8 % nationwide, still not comparable with the 35 % female student membership reported by the National FFA (National FFA, 2000). A more disturbing study by Baker and Baggett in 1995 targeted Pennsylvania agricultural education teachers. That study showed 23 women were teaching agriculture in secondary schools in 1980-81. However, by 1990-91, only six of the original women remained in agricultural education positions in Pennsylvania. Camp's supply and demand study did not include a breakdown by gender until 1998. It was reported in the 1998 study that 15.8% of the agricultural education teacher population is female (Camp, 1998). The Department of Labor (DOL) Women's Bureau reported women comprised 38 % of the labor force in 1970 and 42 % in 1980. Those numbers are expected to increase to a level of 48 % by the year 2008.

Initial gathering of numbers for this study reflected, in spring 2000, a national agricultural education teacher population of 15.77 % female, showing an almost exact replica of Camp's 1998 study reflecting 15.8 % females. Camp also announced a pool of 734 potential agricultural education teachers from the graduating classes of higher education institutions in 1998. Applying the DOL's projection to those agricultural education teachers would mean an increase of 352 women to the pool of potential teachers, assuming the total numbers remained constant from 1998 until 2008. Interestingly, Camp's study also reported 41 % of the newly qualified potential teachers of agricultural education were female. These potential numbers add credence to the projections of the Department of Labor.

Another study of Ohio female agricultural education teachers (Whittington, 1988) determined the women involved in that study rarely supported or encouraged each other. In an effort to promote a higher degree of support among the women at that time, an annual conference for women in the profession was encouraged and activities to encourage the development of supportive relationships included. Whittington reported that failure to provide the necessary supports can trigger a premature decision to drop out on the part of persons involved in non-traditional professions.

A 1991 study by Foster, Pikkert and Husmann looked at self-perception of gender bias among women agriculture teachers in a six state region. The researchers concluded that established female teachers expressed satisfaction in their current positions, however gender bias was viewed as a definite deterrent to women entering the agricultural education profession. They also concluded more women could be encouraged to enter the profession by changing current societal attitudes against women teachers in agriculture, increasing salaries, increasing acceptance by administrators, improving teacher education programs, building support networks and increasing recruitment efforts.

The issue of women in non-traditional careers is not unique to agricultural education. In recent studies of Northern Ireland, it was noted for women entering non-traditional roles, several accepted societal opinions often cause women to struggle in their new environment.

> "...with male workers scrutinizing their every move, and a lack of role models, women are confronted with a social situation that encourages the self-imposed development and enactment of excessive work demands. In the words of a woman carpenter: 'women must be clearly superior to survive in construction work or there will be a hundred reasons to lay her off' (Whittcock, 2000)."

Still another viewpoint from the United Kingdom comes from Conran (1999) as she notes the IBM Women's Leadership Conference in Milan. "IBM cannot, and will not, do without the skills of women in the workplace. Nevertheless, some short-sighted employers cannot see that women at work are an established reality. The nation needs their skills—and their children—while their house-holds need their incomes. But the attitude of these employers to mothers in the workforce is: 'If you don't like the heat, get back to the kitchen.'

In a recent USDA Current Research Information System (CRIS) search, no studies with specific information on women in agricultural education were found. Five studies were found that involved women and agriculture, however only two of these related to this study. An Iowa State University study (Carter, 1992), reported that from 1980 to 1985 fewer females than males took initial jobs related to their majors and more females started a lower salaries. In addition, females were not as satisfied with their current positions and felt uncomfortable or hindered in the workplace because of their gender, supervisor demands for overtime and child care issues (Carter, 1992). Jovanovic at the University of Illinois launched a longitudinal investigation of the characteristics linked to retention of women in engineering in 1997. The 1997 results from the baseline assessment indicated that although the women and men who enrolled in engineering (another area that traditionally draws low numbers of women) in the fall of 1995 shared similar demographic backgrounds, they began their schooling with different expectations.

Objectives

This study was designed to identify current female agricultural education teachers in the United States and determine a demographic profile for those women. Additionally this study sought to describe unique challenges experienced by female agricultural education teachers. Specific objectives for the study are as follows:

1. Describe female agricultural education teachers according to selected demographic characteristics: years experience, educational level, previous industry experience, salary, subjects taught, time expenditures, age, marital status and children.

2. Describe the mentors of these female agricultural teachers and the level of support from other women in the field as perceived by the respondents.

3. Describe the respondents perceived level of job satisfaction, acceptance by others, and discriminating actions.

4. Describe perceived personal and professional barriers facing female agricultural education teachers.

Methods and Procedures

State Supervisors of agricultural education in the United States, Puerto Rico and the Virgin Islands were contacted to help identify female teachers in each state. The population of the study was all female agricultural education teachers identified by state supervisors (N=1694). From the list generated, a proportional stratified random sample was determined. The sample was drawn from the six regions of the National Association of Agricultural Educators (NAAE). The sample for the study consisted of 962 female agricultural education teachers. It should be noted that the total sample was determined by combining the random samples from each region. In early stages, consideration was given to reporting this study as six separate activities, hence the total sample used was larger than necessary. Table 1 shows the breakdown of women in the total secondary agricultural education teacher population by NAAE Region and the determination of the sample by Region.

The questionnaire, developed by the researcher, was reviewed by a panel of six experts, including two female teacher educators and female graduate students in agricultural education,

Table 1

Teacher Numbers by Region and Nationally

NAAE Region	Total Agricultural Education Teachers	Number Female Agricultural Education Teachers	Percent Female Agricultural Education Teachers for Region	Percent Female Agricultural Education Teachers Nationally	Sample Size by Region
1	1733	377	21.75	3.51	188
2	2630	201	7.64	1.87	134
3	1098	186	16.94	1.73	127
4	1915	310	16.19	2.89	171
5[a]	2095	300	14.32	2.79	169
6	1268	320	25.24	2.98	173
Total Number	10739	1694	15.77	100	962

Note: Region 1—AK, AZ, CA, HI, ID, MT, NV, OR, UT, WA, WY
Region 2—AR, CO, KS, LA, NM, OK, TX
Region 3—IA, MN, NE, ND, SD, WI
Region 4—IL, IN, KY, MI, MO, OH
Region 5—AL, FL, GA, MS, NC, PR, SC, TN, VI
Region 6—CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, WV

[a]There were no female agricultural education teachers in the Virgin Islands or Puerto Rico.

for content and face validity. It was also field tested on a group of female secondary level business teachers. Minor wording changes on selected questions were made as a result of their input. The questionnaire contained six sections focusing on educational background, teaching experience, mentoring/motivation, professional treatment, Desert Roses newsletter and web site, and demographics. Question format for each section was predominately checklists and fill-ins. Additionally, the questionnaire included two open-ended questions asking respondents to identify any challenging situations they encountered in the profession, as well as to identify what they perceived to be the greatest challenge or barrier to women in the field. Since the purpose of this study was to create a profile of demographic and personal attributes, reliability was not assessed. Salant and Dillman (1994, p.87) state, "...asking about many personal attributes and behaviors produces very little measurement error."

A mailed questionnaire following a modified Dillman (1978) method was used. The first packet, including a cover letter, an incentive and a copy of the questionnaire designed with a return-addressed, postage-paid cover, was mailed in April 2000. Instruments were coded to allow follow-up. Three follow-ups were conducted using electronic mail, postcards and telephone calls. The final usable response rate was 60 % (N=579). Due to the unique and individual characteristics being investigated results of this study cannot be generalized beyond those women who responded.

The Statistical Package for the Social Sciences (SSPS 10.1) was used to analyze the data associated with this research. Means and standard deviations were computed on all questions requiring an agreement rating response. Qualitative analyses were completed on the open-ended responses in the questionnaire. Responses were initially defined and organized into common themes.

Findings

The results of this study are reported by objective.

Objective one: Demographic Profile

Lists provided by state supervisors identified 1694 females employed as agricultural education secondary and middle school teachers in spring 2000, indicating that women comprised only slightly over 15 % of the total agricultural education teachers.

The respondents' experience in teaching was reported with the majority (54.5 %) having taught 1-5 years. Another 20.4 % reported teaching 6-10 years, followed by a smaller percentage (11.7) having taught 11-15 years. An even smaller number of respondents (8.6 %) reported teaching 16-20 years and only 4.9 % reported teaching over 20 years. A majority (61.2 %) of the female agricultural education teachers in this study held bachelors degrees, while 38.2 % held masters degrees, and less than 1 (0.4) % held a doctoral degree. Over 66 % reported interest in increasing their level of education. Of the respondents, 61.9 % (n=579) took agricultural education classes in high school and 56.8 % were former members of FFA. Of the 37.9 % who did not take agricultural education classes in high school, 19 % reported classes were not available. Another 7.1 % reported that agricultural education classes conflicted with their other classes and 6.4 % responded that no girls were allowed to take agricultural education classes while they were in school. Eighty-two percent of the respondents reported previous experience in some area of the agricultural industry.

When reporting salary ranges, 26.9 % of the respondents fell into the $30-$34,999 range. Another 20.6 % reported salaries in the $25-$29,999 range, followed by 15.9 % reporting in the $35-$39,999 range. Eleven point one percent of the respondents reported salaries in the $40-$44,999 range and 10.6 % reported salaries over $50,000. Only 5.9 % reported salaries in the range of $45-$49,999, and the remaining 9.0 % reported salaries under $24,999. When salary ranges were compared with years experience women who taught 1-5 years most often reported salaries in the $25-$29,999 range. Those who taught 6-10 years fell in the range of $35-$39,999, while those with 11-15 years of experience ranged between $40 and $44,999. Women with 16-20 years experience reported salaries in the $40-$44,999 range and those with 21-25 years experience fell into the $45-$50,000 range. Interestingly women who taught over 26 years most often reported salaries in the $45-$50,000 range, although some reported salaries over $50,000.

Respondents reported a diverse variety of subjects taught. Topics most frequently taught by women were FFA (84 %) and horticulture (76.5 %). Topics least likely to be taught by women were hydroponics (23.8 %) and aquaculture (25.7 %). A breakdown of those areas is shown in Table 2. In addition to their time in the classroom (25 hours per week), female agricultural education teachers also spend an average of 27 hours per week on related activities. These women reported averages of 8.8 hours preparing for class, 7.1 hours on FFA activities, 2.5 hours on SAE visits, 1.8 hours in committee meetings and 5.9 hours in other work-related activities. Combined the subjects averaged 68.6 hours of obligated time per week. Those

Table 2

Subject matter taught by respondents

Subject matter topics	Percentage of respondents teaching this topic
Animal Science	75.0
Aquaculture	25.7
Companion Animals	29.7
FFA	84.1
Horticulture	76.5
Leadership	67.7
Plant Science	72.2
Agricultural Business	46.3
Agricultural Mechanics	39.6
Equine Science	33.9
Food Science	26.1
Hydroponics	23.8
Marketing	35.8
Soil Science	51.5

respondents who reported personal/family related activities reflected an average of an additional 17.5 hours per week involvement time. A mean of 7.9 hours for domestic (housework), 4.9 hours for family obligation/time, 1.3 hours devoted to health care, 2.0 hours for religious activities and 1.4 hours for activities for their own children's schools. Figure 1 shows a breakdown of these hours by week.

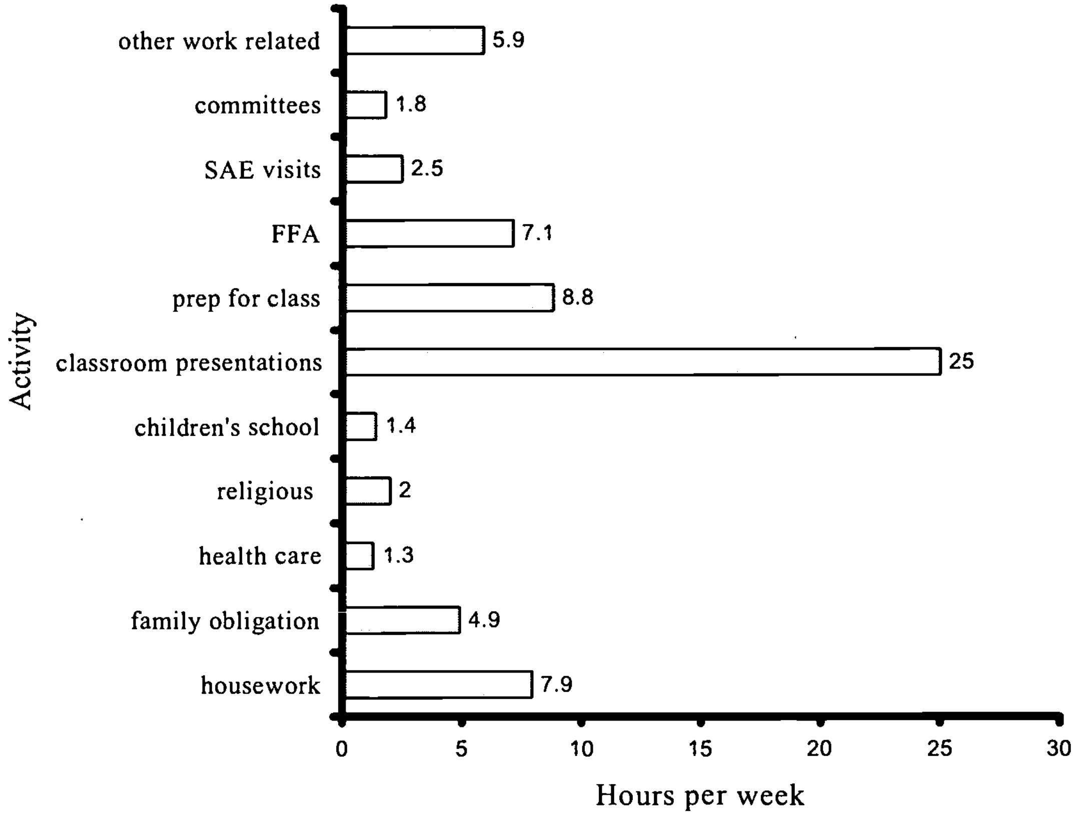

Figure 1. Breakdown Of Hours Committed During Week.

When addressing more personal issues, 64.2 % of the respondents were married with another 22.6 % having never married. Among the respondents, 9.2 % were divorced and 3.9 % were divorced and remarried. Fifty three percent reported having children (Figure 2). The average age of the respondents was 33.7 years, with a range of age from 22 years to 62 years old.

Objective two: Mentors and Support Systems

The majority (76.9 %) of female agricultural education teachers reported some type of regular contact (weekly, monthly, quarterly or yearly) with other female teachers in the profession. Of that 76.9 %, only 23.1 % reported that contact as happening once a week, while 41.1% made contact with other female agricultural education teachers once a month, 25.7 %

made contact once a quarter, 9.3 % made contact with other female agricultural education teachers once a year and 0.8% of the respondents did not complete this question.

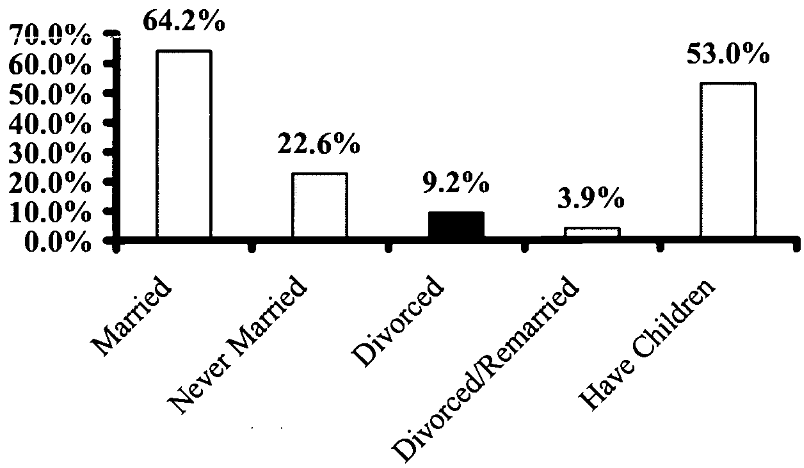

Figure 2. Family Status

Telephone and professional meetings were reported as the main forms of maintaining contact followed by in-person contact and email. Less than 5 % used written letters (Table 3). Respondents were asked to mark all that applied so frequencies are higher than the number in the sample.

Table 3

Preferred Methods of Maintaining Contact (N = 579)

	n[a]	Percent
Telephone	352	60.8
Email	219	37.8
In person	319	55.1
Letters	28	4.8
Professional Meetings	407	70.3

[a]n=cases reporting use of method out of 579 respondents

When asked about their career mentors, respondents suggested a variety of situations. Gender representation was broken down to 37.5 % male, 3.6 % female and 59.0 % reported as a combination of mentors from both genders. Former high school agricultural education teachers were most frequently reported as mentors (41.1 %). This group was followed by parents/relatives (21.0 %), and college professors/advisors (15.4 %). The remaining reported mentor relationships divided among other teachers, friends and spouses. Additionally, nearly two-thirds, 64.7 % reported active membership in the NAAE.

Objective three: Job Satisfaction/Acceptance

Using a five-point Likert scale, women reported enjoyment with their current position. More than 81 % of the respondents reported being very satisfied with their current position. Still, almost two thirds (61.7 %) felt they experienced some form of barrier due to their gender.

When respondents were asked about their observation of administrators' perceptions of their ability to perform their jobs, 53.8 % perceived that when first hired their administrators felt their ability to perform the job was above average to excellent. The respondents reported that after being on the job they felt 91.2 % of their administrators would rank their ability to perform the job above average to excellent.

In review of their professional career, respondents were asked if they felt they ever experienced any discriminating questions during job interviews. Although 24.3 % reported they were asked discriminating questions during their **first** job interview, only 8.7 % reported they were asked such questions during their last interview. Most women held less than two teaching positions ($\underline{M}$ = 1.73) at the time of the study.

Objective four: Perceived Barriers

When asked to respond to the two open-ended questions, responses were grouped and sorted to determine trends. Some respondents provided multiple responses and some elected not to respond to the open-ended questions at all. The first open-ended question asked respondents, "What do you perceive to be the greatest barrier faced by female agricultural education teachers?" There were 518 comments recorded. The most significant area or trend to surface was *acceptance by peers and other males in industry.* Over 144 individual comments were recorded, similar in nature to the following example: "Other ag teachers (male) view the female teachers as "hobby advisors"—the largest problem I see in being a female ag teacher is having to "prove" you are qualified." Other areas that produced significant response included: *balancing family and career, acceptance by administrators, acceptance by community,* and *gender-related issues.* Still other trends identified, but given lesser significance were *acceptance by students* and *having to prove yourself.*

The second question, "Do you feel you have experienced any barriers or challenges as a teacher due to your gender? If yes, please explain," yielded 342 comments. It should be noted here that 61.7 % of the respondents answered yes to this question. The most significant trend identified in this scenario was *being accepted by parents and community.* An example of these comments was "Some parents have a hard time accepting a woman in a "man's field"..." Acceptance by parents and community was followed by identified trends of *acceptance by peers, acceptance by administrators* and *business leaders and acceptance by students.* These issues were followed by less significant trends identified as *need to continually prove yourself, gender-related issues* and *family life—balancing career and family.*

Conclusions and Recommendations

According to the respondents of this study, the profile of the female agricultural education teacher depicts a 33 year old, who is married and has children. This woman holds a bachelors degree with hopes to pursue a higher level of education. She has taught ten years or less and had experience with agricultural education and FFA in high school. Her average salary is approximately $30,000. In addition, she has some previous experience in the agriculture industry. The profile of the female agricultural education teacher, as depicted by these respondents, defines a woman who spends an average of 51.8 hours at her professional occupation each week and an additional 17 hours meeting family obligations. She has contact with other women in the field once a month, usually by telephone, but also at professional meetings. Her mentor was male and was probably her high school agricultural education teacher. Although this professional woman perceives she has experienced gender challenges, she is satisfied with her chosen field of work.

The high percentage of women having taught less than 10 years with an average age of 33 denotes short-term careers for women in the field. Additionally the comparison of numbers of women at the time of this study and those figures reported by Camp in 1998 indicate a stabilization trend in the number of women in the field. Research concerning the emergence of women into the field should be continued. In addition, research focusing on the retention of women in the profession should be addressed.

The number of women reporting families, along with extensive after hours work responsibilities, acknowledges unique challenges facing these working women. This study is in agreement with a recent study by Rosencrans and Seevers (2001), that notes "Involving volunteers with special skills and expertise is a way to broaden the knowledge base available to students and allow teachers to focus on other areas." To assist in balancing family and workload, women should identify and utilize volunteers and community resources to assist with and expand their programs. Seminars, workshops, in-service training and newsletters should be developed on topics of balancing work and family. Studies reporting possible alternative work scenarios for agricultural education teachers could be beneficial in enticing and retaining women into the profession.

Challenges facing women in this field were identified in general and through personal experiences reported in the open-ended sections of the questionnaire. This study agrees with Foster, Pikkert and Husmann that gender bias could be a definite deterrent to woman entering the profession. The top three barriers, as perceived by women in the field, included acceptance by peers and other males in industry, balancing family and career and acceptance by administrators. Although women reported increasing levels of acceptance by their administration as their tenure increased, other barriers of acceptance were still a concern. The three barriers or challenges most often personally experienced by the respondents included acceptance by parents and community, acceptance by peers (male teachers), and acceptance by administrators and business leaders. When starting new positions, women should work to become involved in other community activities and organizations in order to increase familiarity with their abilities and thereby increase credibility. Another area for expanded research opportunity would be an in-depth qualitative study revolving around both the open-ended comments and the unsolicited comments retrieved in this study.

Women in agricultural education identified a limited network of peers to consult with. Only 3.6 reported females as their primary mentors although many reported a combination of male and female mentors. However male contact was definitely predominant. Individual state agricultural education professional organizations should promote the use of a structured mentoring system that pairs experienced women in the field with beginning female teachers. Mentors and mentees should maximize communication opportunities by increasing frequency of contact through utilizing existing technologies such as email. Also in an effort to increase retention of women in the field, mentors and advisor (teacher educators) should encourage more female agricultural education teachers and student teachers to visit the Desert Roses web site and open forum. *Desert Roses newsletter and web site are part of a non-profit, pro-active support communication system for women in agricultural education.* Finally, professional organizations, such as the NAAE, should help organize and sponsor forums and/or conferences for women to discuss challenges and situations unique to their gender.

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A Comparison of the Professional Development Needs of Kansas and Missouri Teachers of Agriculture

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Abstract

Professional development programs are needed to provide teachers of agriculture with the technical information and skills required to successfully meet the demands of a changing educational environment and advances in technology. Therefore, the purpose of this study was to analyze and compare the professional development needs of secondary agriculture teachers in the states of Kansas and Missouri. Specific research objectives were to identify similarities and differences in the professional development needs of secondary agriculture teachers in those states, and to compare the professional development needs of secondary agriculture teachers in Kansas and Missouri based on years of teaching experience.

Three items: writing grant proposals for external funding, modifying the curriculum to meet changes in technology, and designing and modifying curriculum and course offerings to attract high quality students, were rated among the five items of greatest need for teachers in both states. An additional seven items were included among the top fifteen items for each group of teachers. In contrast, teachers in the two states ranked eleven of the 52 items considerably differently. Beginning teachers were found to have greater needs for professional development in technical agriculture areas than had been found in previous research. The most experienced group of teachers from each state identified strong needs for professional development in topics pertaining to computers, related technology, and applications. Although needs assessment findings from other states can definitely assist state leaders in refining their own potential lists of professional development topics, sufficient differences existed between these two states to warrant individual periodic needs assessments in each individual state.

Introduction/Theoretical Framework

State leaders of agricultural education in the public schools face many challenges. Supervisory personnel in state departments of education have the responsibility of securing new, and maintaining current program funding. They plan and deliver a plethora of FFA, Alumni, and adult education activities. They work with school administrators to develop new relationships and find ways to meet the growing demand for agriculture instructors. In addition, they conduct local program evaluations, and provide guidance in the administration of programs. Teacher educators have commitments to teaching, advising, research, recruitment, securing external grant funding, and other administrative duties. They handle these commitments with the pressures of downsizing in higher education. Agriculture teachers are expected to teach a dynamic and changing curriculum to a rapidly changing student population in their local programs. They conduct Supervised Agricultural Experience visits, oversee countless FFA activities, deal with administrative matters, and they work to build positive relationships within the communities where they teach. Among these three groups, the responsibility to plan and deliver professional development activities for teachers is commonly shared. With all the demands of state leaders' time, planning quality professional development activities for teachers may not always receive the attention it deserves. However, professional development is a necessity to provide agriculture teachers the knowledge and skills needed to successfully meet the demands of a changing educational environment and advances in technology (Niven, 1993).

Professional development programs for teachers of agriculture are often established reflecting the current trends in education or new developments in the agriculture, food, fiber, and natural resource industry. Although some states have conducted separate beginning teacher sessions, professional development programs typically are designed for all agriculture teachers in a particular state without regard to years of teaching experience. Many times, professional development activities are planned and conducted by university faculty and/or state supervisory staff without teacher input. Sofranko and Khan (1988) established that the individuals likely to be involved in, or affected by, an educational program should be the starting point from which programs emerge. Like any effective educational experience, professional development activities should be meaningful to teachers and should reflect areas in which they have a felt need for professional growth. Individuals are more motivated to learn when they are actively involved in planning learning activities (Newcomb, et. al., 1993, p. 32).

A growing pool of research has been conducted identifying the professional development needs of agriculture teachers within selected states. Gamon, et al. (1994) found that Iowa agriculture teachers needed inservice in agricultural environmental impact, natural resource management, government policy, impact of the global market, and the processing of agricultural products. King and Garton (2000) identified the use of computers, writing grant proposals, attracting quality students, biotechnology applications, and landscaping as areas of high professional development need for teachers in Missouri. Agriculture teachers in South Carolina desired up-dates and assistance with using computers and related technology, preparing award applications, record keeping, public relations, adult education, and developing Supervised Agricultural Experience opportunities (Layfield & Dobbins, 2000). Though commonalities exist between the findings of studies conducted in other states, the question remains, do teachers in states with comparable agricultural enterprises and similar student populations have the same professional development needs?

Although not difficult to conduct, assessments of professional development needs require organization and a substantial commitment of time (Caffarella, 1982). Additionally, needs assessments should be conducted at regular intervals to accurately reflect the changing needs of teachers, students, and the agriculture, food, fiber, and natural resource industry. Gamon, et al. (1994) concluded that needs of instructors for inservice education should be periodically assessed before planners contract to develop materials and training plans. If needs assessments in agriculturally and geographically similar states produce consistently similar results, professional development planners in those states could potentially share the burden of conducting regularly scheduled assessments. Furthermore, the responsibility for planning and delivering quality professional development activities could be performed on a reciprocal basis between states. Research is warranted that can identify commonalities and differences between teachers in similar states.

Purpose and Objectives

The purpose of this study was to analyze and compare the professional development needs of secondary agriculture teachers in Kansas and Missouri. The specific objectives of the study were to:

1. Identify similarities and differences in the professional development needs of secondary agriculture teachers in the states of Kansas and Missouri.

2. Compare the professional development needs of secondary agriculture teachers in the states of Kansas and Missouri based on years of teaching experience.

Methods/Procedures

The target population for this descriptive study was secondary agriculture teachers in Kansas ($\underline{N}$ = 175) and Missouri ($\underline{N}$ = 385). The accessible population in Kansas consisted of teachers who participated in the annual state teachers' conference or who responded to a follow-up mailed questionnaire ($\underline{n}$ = 139). The accessible population in Missouri consisted of teachers who participated in the annual state teachers' conference or statewide fall workshop ($\underline{n}$ = 348).

An instrument to assess the professional development needs of agriculture teachers was developed based upon a review of the literature (Neason, 1992; Garton & Chung, 1996; Briers & Edwards, 1998). The instrument was reviewed by a panel of experts consisting of teacher educators, state supervisors, and agriculture teachers for face and content validity. After suggestions by the panel of experts were taken into account, modifications resulted in a 52-item instrument. The items were grouped into four categories: 1) student and teacher development, 2) instruction and curriculum, 3) technical agriculture, and 4) program management and planning. Internal consistency for each of the four sections was established and ranged from .80 to .89 (Cronbach's alpha).

The professional development needs instrument was administered at the respective state teachers' summer professional conferences. Respondents signed a card indicating they had completed and returned the instrument, therefore providing anonymity to respondents.

Kansas teachers not attending the summer conference were contacted by mail and were requested to complete the instrument. Data from the two collection points were compared and found to be comparable and consistent. The total number of usable questionnaires was 139, resulting in a response rate of 79.4%. In Missouri, teachers that did not attend the summer conference were given the opportunity to complete the questionnaire during a fall statewide workshop. Data from the two collection points were compared and found to be comparable and consistent. The total number of usable questionnaires was 348, resulting in a response rate of 90.3%.

Results/Findings

The first objective sought to compare the professional development needs of secondary agriculture teachers in the states of Kansas and Missouri. The professional development items were grouped into four categories: 1) student and teacher development, 2) instruction and curriculum, 3) technical agriculture, and 4) program management and planning. In the area of student and teacher development (Table 1), teachers in both states identified preparing proficiency and degree applications, preparing for career development events, and developing SAE opportunities for students as the three most important items. A comparison of these items in terms of their overall rank with the items in the three remaining categories revealed that Kansas teachers identified preparing proficiency and degree applications as the item of greatest need for professional development. The ranking of mean responses for Missouri teachers however, placed this item 22nd overall. Comparison of the remaining eight items in this category reflects strong similarities between teachers in the two states.

Table 1

Student and Teacher Development

Item	Kansas (n = 139)				Missouri (n = 339)			
	CR[a]	OR[b]	M	SD	CR[a]	OR[b]	M	SD
Preparing proficiency and degree applications	1	1	3.94	.93	3	22	3.29	1.11
Preparing for career development events	2	11	3.50	.95	1	19	3.30	1.08
Developing SAE opportunities for students	3	19	3.32	1.12	1	19	3.30	1.06
Supervising SAE programs – traditional and non-traditional	4	31	3.17	1.04	4	29	3.19	1.08
Managing and reducing work-related stress	5	35	3.15	1.16	7	44	2.98	1.18
Planning and conducting FFA chapter activities	6	37	3.09	.92	6	43	3.02	1.05
Time management tips and techniques	6	37	3.09	1.08	5	38	3.07	1.18
Developing professionally	8	41	3.03	.98	8	49	2.86	1.12
Organizing an alumni association	9	51	2.79	1.16	9	52	2.71	1.17

Note. Items rated on 5 point scale (1 = No Need, 2 = Some Need, 3 = Moderate Need, 4 = Strong Need, 5 = Extreme Need). Grand mean for all 52 items in Kansas = 3.25, Grand mean for all 52 items in Missouri = 3.24

[a]Rank within the category, [b]Overall rank on the 52 items

In the category of instruction and curriculum strong similarities were found between Kansas and Missouri teachers of agriculture. Teachers in both states identified the same four items as most important within the category (Table 2).

Additionally, the top three items for each state in instruction and curriculum were among the top ten for both states overall. These items included: designing and modifying curriculum and course offerings to attract high quality students, modifying the curriculum to meet changes in technology, and using computer technology and computer applications (spreadsheets, presentation software, etc.). Furthermore, Missouri teachers identified using computer technology and computer applications (spreadsheets, presentation software, etc.) as the item with their overall greatest need for professional development training.

Table 2

Instruction and Curriculum

Item	Kansas (n = 139)				Missouri (n = 339)			
	CR[a]	OR[b]	M	SD	CR[a]	OR[b]	M	SD
Designing and modifying curriculum and course offerings to attract high quality students	1	3	3.78	.93	3	5	3.69	.93
Modifying the curriculum to meet changes in technology	2	4	3.76	.88	2	3	3.75	.94
Using computer technology and computer applications (spreadsheets, presentation software, etc.)	3	7	3.60	1.01	1	1	3.79	1.10
Motivating students – teaching techniques and ideas	4	14	3.40	1.03	4	13	3.45	1.06
Integrating agriscience into the curriculum	5	19	3.32	.92	6	18	3.34	1.01
Managing learning laboratories	6	23	3.25	1.06	5	16	3.37	1.09
Teaching students problem solving and decision making skills	7	30	3.18	.95	7	25	3.25	1.05
Managing student behavior	8	49	2.83	1.01	8	47	2.90	1.02

Note. Items rated on 5 point scale (1 = No Need, 2 = Some Need, 3 = Moderate Need, 4 = Strong Need, 5 = Extreme Need). Grand mean for all 52 items in Kansas = 3.25, Grand mean for all 52 items in Missouri = 3.24

[a]Rank within the category, [b]Overall rank on the 52 items

Several differences and similarities of note surfaced in the category of technical agriculture (Table 3). Advances in biotechnology and computer applications in agriculture were identified as the two most important items within the category to teachers in both states, and both items were included in the ten highest ranking items overall. In addition, animal reproduction and embryo transfer, and genetic engineering were included among the top fifteen items for teachers in each state. Furthermore, three items were among the fifteen items ranked lowest for teachers in both states. Those items included: water quality, waste management, and oxy-acetylene welding and plasma cutting.

Further analysis revealed that six of the technical agriculture topics received noticeably different rankings from teachers in their respective states. Record keeping skills were the 10th overall item of professional growth need for Kansas teachers and 33rd for teachers in Missouri. Landscaping was ranked 7th in Missouri and 28th in Kansas. Missouri teachers also ranked greenhouse operation and management, agricultural mechanics project construction, food science and food safety, and small engine technology noticeably higher than did Kansas teachers.

Table 3

Technical Agriculture

Item	Kansas (n = 139) CR[a]	OR[b]	M	SD	Missouri (n = 339) CR[a]	OR[b]	M	SD
Advances in biotechnology	1	6	3.63	.99	2	6	3.58	1.05
Computer applications in agriculture	2	9	3.56	1.01	1	4	3.70	1.12
Record keeping skills	3	10	3.52	1.04	17	33	3.10	1.14
Animal reproduction and embryo transfer	4	12	3.43	1.03	4	8	3.52	1.20
Genetic engineering	4	12	3.43	1.00	7	14	3.42	1.11
Agricultural sales and marketing	6	14	3.40	.98	10	19	3.30	1.12
Financial management	7	16	3.37	.93	12	24	3.26	1.09
Meat science	8	17	3.35	.96	6	11	3.49	1.05
Greenhouse operation and management	9	18	3.33	1.13	5	10	3.50	1.19
Global Positioning Systems (GPS)	10	22	3.29	1.08	14	27	3.20	1.26
Animal nutrition	11	25	3.23	.97	20	36	3.09	1.10
Soil Science	12	27	3.22	.96	21	38	3.07	1.08
Landscaping	13	28	3.20	1.10	3	7	3.54	1.13
Electricity and controls	13	28	3.20	1.04	17	33	3.10	1.12
Natural resource management	15	31	3.17	1.07	11	22	3.29	1.11
Ag mechanics project construction	15	31	3.17	1.23	8	15	3.41	1.18
Tissue culture	17	36	3.12	1.08	13	27	3.21	1.18
Water quality	18	39	3.08	.96	22	41	3.04	1.10
Food science and food safety	19	40	3.06	1.01	9	17	3.35	1.09
Tool and machine conditioning and repair	20	45	2.95	1.14	16	31	3.12	1.16
Floriculture	21	47	2.92	1.12	15	30	3.15	1.19
Waste management	22	48	2.86	.98	24	47	2.90	1.10
Oxy-Acetylene welding and plasma cutting	23	50	2.80	1.12	23	45	2.97	1.16
Small engine technology	24	52	2.65	1.19	19	33	3.10	1.24

Note. Items rated on 5 point scale (1 = No Need, 2 = Some Need, 3 = Moderate Need, 4 = Strong Need, 5 = Extreme Need). Grand mean for all 52 items in Kansas = 3.25, Grand mean for all 52 items in Missouri = 3.24

[a]Rank within the category, [b]Overall rank on the 52 items

Analysis of responses in the program management and planning category revealed similar findings between the teachers in Kansas and Missouri (Table 4). Three items: writing grant proposals for external funding, recruiting and retaining quality students, and building the image of agriculture programs and courses, were among the highest ranking 15 items in both states. Completing reports for local and state administrators, evaluating the local agriculture program, and utilizing a local advisory committee were ranked noticeably higher for teachers in

Kansas than in Missouri. Conversely, Missouri teachers found planning and maintaining a school land lab to be a greater professional development need than did Kansas teachers.

Table 4

Program Management and Planning

	Kansas (n = 139)				Missouri (n = 339)			
Item	CR[a]	OR[b]	M	SD	CR[a]	OR[b]	M	SD
Writing grant proposals for external funding	1	2	3.80	1.16	1	2	3.78	1.15
Recruiting and retaining quality students	2	5	3.68	1.02	3	12	3.49	1.09
Building the image of agriculture programs and courses	3	7	3.60	.99	2	8	3.52	1.03
Completing reports for local and state administrators	4	21	3.30	1.10	10	50	2.84	1.14
Evaluating the local agriculture program	5	23	3.25	.99	8	41	3.04	.99
Utilizing a local advisory committee	6	25	3.23	.98	7	40	3.06	1.09
Developing business/community relations	7	31	3.17	.97	5	32	3.11	1.03
Planning and effective use of block scheduling	8	42	2.99	1.30	11	51	2.81	1.31
Conducting needs assessments and surveys to assist in planning the secondary and/or adult program	9	43	2.98	.97	9	46	2.95	1.04
Establishing a working relationship with local media	10	44	2.96	.92	6	36	3.09	1.05
Planning and maintaining a school land lab	11	46	2.93	1.15	4	26	3.24	1.15

Note. Items rated on 5 point scale (1 = No Need, 2 = Some Need, 3 = Moderate Need, 4 = Strong Need, 5 = Extreme Need). Grand mean for all 52 items in Kansas = 3.25, Grand mean for all 52 items in Missouri = 3.24

[a]Rank within the category, [b]Overall rank on the 52 items

The second objective sought to compare the professional development needs of secondary agriculture teachers in the states of Kansas and Missouri based on years of teaching experience. Teachers were divided into three categories: Five years or less, six to 15 years, and 16 or more years of teaching experience.

An examination of the top 15 items for teachers with five years of teaching experience or less indicated beginning teachers in both states identified nine of the same items (Table 5). Among these items, writing grant proposals for external funding was ranked first by both groups of teachers, while recruiting and retaining quality students was 2nd in Missouri and 3rd in Kansas. Interesting contrasts were the inclusion of preparing proficiency and degree applications and developing SAE opportunities for students by Kansas teachers only, and the inclusion of animal reproduction, landscaping, and motivating students by Missouri teachers only.

Of the fifteen items with the greatest professional development need, Missouri's least experienced teachers included eight technical agriculture items, four instruction and curriculum items, three items pertaining to program management and planning, and none in the area of student and teacher development. Kansas teachers included five technical agriculture items, five program management and planning items, three items related to student and teacher development, and two items in the instruction and curriculum category.

Table 5

Top 15 Items for Teachers With Five Years Experience or Less

	Kansas (n = 42)			Missouri (n = 116)		
Item	Rank	M	SD	Rank	M	SD
Writing grant proposals for external funding	1	4.15	.96	1	3.98	1.05
Preparing proficiency and degree applications	2	4.05	1.03			
Recruiting and retaining quality students	3	3.98	.99	2	3.72	1.05
Designing and modifying curriculum and course offerings to attract high quality students	4	3.90	.96	6	3.66	.95
Modifying the curriculum to meet changes in technology	5	3.76	.91	4	3.67	.90
Building the image of agriculture programs and courses	6	3.73	.90	8	3.63	1.08
Developing SAE opportunities for students	7	3.69	1.09			
Computer applications in agriculture	7	3.69	1.07	4	3.67	1.13
Ag Mechanics project construction	9	3.67	1.14	15	3.44	1.30
Greenhouse operation and management	9	3.67	1.05	9	3.62	1.18
Advances in biotechnology	11	3.64	.93	12	3.50	1.06
Completing reports for local and state administrators	12	3.63	.99			
Agricultural sales and marketing	13	3.60	.83			
Evaluating the local agriculture program	14	3.56	.87			
Preparing for Career Development Events	15	3.55	.94			
Animal reproduction A.I. and embryo transfer				3	3.68	1.19
Landscaping				7	3.65	1.07
Motivating students – teaching techniques and ideas				9	3.62	.99
Using computer technology and computer applications (spreadsheets, presentation software, etc.)				11	3.57	1.17
Genetic engineering				13	3.47	1.04
Meat science				13	3.47	1.12

Note. Grand mean for all 52 items in Kansas = 3.39. Grand mean for all 52 items in Missouri = 3.37

In the group of teachers with six to 15 years of experience, ten items were identified among the top 15 by teachers in both states (Table 6). Teachers in both states included writing grant proposals for external funding, designing and modifying curriculum and course offerings to attract high quality students, and modifying the curriculum to meet changes in technology in the top five. Kansas teachers ranked preparing proficiency and degree applications, and recruiting and retaining quality students first and second respectively while Missouri teachers omitted these two items from their top 15. Furthermore, Missouri teachers included ten technical agriculture topics in the top ten compared to only six for Kansas teachers.

Table 6

Top 15 Items for Teachers With 6 to 15 Years of Experience

	Kansas (n = 41)			Missouri (n = 94)		
Item	Rank	M	SD	Rank	M	SD
Preparing proficiency and degree applications	1	4.00	.81			
Writing grant proposals for external funding	2	3.78	1.17	5	3.59	1.28
Recruiting and retaining quality students	2	3.78	1.04			
Designing and modifying curriculum and course offerings to attract high quality students	4	3.71	.78	4	3.62	.95
Building the image of agriculture programs and courses	5	3.66	1.04	11	3.42	.91
Modifying the curriculum to meet changes in technology	5	3.66	.85	2	3.74	.99
Preparing for Career Development Events	7	3.63	.86			
Advances in biotechnology	8	3.59	1.07	6	3.54	1.04
Meat science	9	3.51	.93	8	3.48	1.07
Motivating students – teaching techniques and ideas	10	3.44	1.10			
Using computer technology and computer applications (spreadsheets, presentation software, etc.)	10	3.44	.74	1	3.88	1.05
Record keeping skills	10	3.44	1.21			
Genetic engineering	13	3.39	1.00	15	3.28	1.14
Greenhouse operation and management	13	3.39	1.14	9	3.46	1.20
Computer applications in agriculture	15	3.32	.96	3	3.73	1.17
Animal reproduction and embryo transfer				7	3.49	1.22
Landscaping				10	3.43	1.24
Ag mechanics project construction				12	3.39	1.07
Food science and food safety				13	3.33	1.09
Integrating agriscience into the curriculum				14	3.30	1.07

Note. Grand mean for all 52 items in Kansas = 3.18. Grand mean for all 52 items in Missouri = 3.15

The final group of teachers, those with 16 or more years of experience, included nine of the same items within their respective lists of 15 items with greatest need. These nine items were ranked in similar order between the two states as can be seen in Table 7. Teachers in this most experienced group from both states included three technology related items in their top five. Those items included were: using computer technology and computer applications (spreadsheets, presentation software, etc.), modifying the curriculum to meet changes in technology, and computer applications in agriculture. The most notable difference among teachers with 16 or greater years of experience is the number three ranking of preparing proficiency and degree applications by Kansas teachers and the exclusion of that item from the top 15 by Missouri teachers.

Table 7

Top 15 Items for Teachers With 16 or More Years of Experience

	Kansas (n = 56)			Missouri (n = 100)		
Item	Rank	M	SD	Rank	M	SD
Using computer technology and computer applications (spreadsheets, presentation software, etc.)	1	3.87	1.01	1	4.00	.99
Modifying the curriculum to meet changes in technology	2	3.82	.88	2	3.77	.96
Preparing proficiency and degree applications	3	3.80	.94			
Designing and modifying curriculum and course offerings to attract high quality students	4	3.73	1.02	5	3.67	.93
Advances in biotechnology	5	3.64	1.00	6	3.64	1.05
Computer applications in agriculture	5	3.64	.98	3	3.71	1.09
Writing grant proposals for external funding	7	3.57	1.25	4	3.70	1.14
Record keeping skills	8	3.55	.87			
Financial management	9	3.52	.91			
Genetic engineering	10	3.50	1.04			
Building the image of agriculture programs and courses	11	3.46	1.03	12	3.37	1.07
Global Positioning Systems (GPS)	12	3.45	1.03			
Animal reproduction and embryo transfer	12	3.45	1.01			
Recruiting and retaining quality students	14	3.39	.97	10	3.39	1.11
Preparing for Career Development Events	15	3.37	1.02	12	3.37	1.03
Landscaping				7	3.54	1.11
Meat science				8	3.51	1.01
Managing learning laboratories (mechanics, horticulture)				9	3.41	1.06
Motivating students – teaching techniques and ideas				10	3.39	1.09
Teaching students problem-solving and decision making skills				12	3.37	1.04
Greenhouse operation and management				12	3.37	1.24

Note. Grand mean for all 52 items in Kansas = 3.20. Grand mean for all 52 items in Missouri = 3.19

Conclusions/Implications/Recommendations

The results indicated many similarities and some differences in the professional development needs between agriculture teachers in the states of Kansas and Missouri. Three items, 1) writing grant proposals for external funding, 2) modifying the curriculum to meet changes in technology, and 3) designing and modifying curriculum and course offerings to attract high quality students, were rated among the five items of greatest need for both states. When evaluating the fifteen items of greatest professional development need in both states, ten items were identified in both Kansas and Missouri. In addition to the three previously listed items, the ten items included: 4) using computer technology and computer applications, 5) motivating students, 6) computer applications in agriculture, 7) animal reproduction and embryo transfer, 8) genetic engineering, 9) recruiting and retaining quality students, and 10) building the image of agriculture programs and courses. Interestingly, none of the ten needs represented items in the area of student and teacher development.

The similarities between states did not only include those items rated highest. Of the fifteen items ranked lowest by teachers in both states, eight of the same items were identified. These included: 1) developing professionally, 2) organizing an alumni association, 3) managing student behavior, 4) water quality, 5) waste management, 6) oxy-acetylene welding and plasma cutting, 7) planning and effective use of block scheduling, and 8) conducting needs assessments and surveys to assist in planning the secondary and/or adult program.

Of the 52 professional development items, teachers in the two states ranked eleven considerably differently. Kansas teachers rated 1) preparing proficiency and degree applications, 2) record keeping, 3) completing reports for state and local administrators, 4) evaluating the local program, and 5) utilizing the local advisory committee notably higher than did Missouri teachers. Conversely, Missouri teachers ranked 6) landscaping, 7) agriculture mechanics project construction, 8) food science and food safety, 9) floriculture, 10) small engine technology, and 11) planning and maintaining a school land lab, considerably higher than did Kansas teachers.

Comparing the professional development needs based on years of teaching experience produced similarities and differences between the two states, as well as among the three teaching experience groups. Of the fifteen items with the highest overall need for professional development, six were identified by all teachers, regardless of state or years of experience. The six expressed needs were: 1) designing and modifying curriculum and course offerings to attract high quality students, 2) modifying the curriculum to meet changes in technology, 3) advances in biotechnology, 4) computer applications in agriculture, 5) building the image of agriculture programs and courses, and 6) writing grant proposals for external funding. Teachers from all three experience categories in Kansas included preparing proficiency and degree applications among their top three needs while no group of Missouri teachers included this item in their top fifteen items. Missouri teachers however, consistently ranked landscaping in their top ten items while no group of Kansas teachers listed this item higher than 20th.

The increased emphasis for professional development in Kansas relating to proficiency and degree applications as well as record keeping skills most likely is a reflection of the recent development and adoption of a new state financial record keeping system. The higher ranking of landscaping and floriculture by Missouri teachers is likely a reflection of the fact that the Missouri Department of Labor has recently named occupations in horticulture as "high demand occupations," thereby making enhancement grants pertaining to this area available from the state Department of Education. Other high demand areas in Missouri related to technical agriculture items can likely be attributed to new or revised state-specific curriculum and approved courses.

In the category of teachers with less than five years of teaching experience, Missouri teachers included eight items from the technical agriculture category among their top fifteen needs while Kansas beginning teachers included five technical agriculture items on their highest ranking items. These results, especially those for young Missouri teachers, somewhat contradict previous findings (Claycomb & Petty, 1983; Garton & Chung 1996) that beginning teachers rated technical agriculture items lower than items related to pedagogy, program planning and evaluation, and program administration. These findings would imply that young teachers in both states have a need for professional development offerings in technical agriculture areas.

The most experienced group of teachers from both states, those with 16 or more years of teaching experience, placed a strong emphasis on the need for professional development pertaining to technology. Teachers from both states included using computer technology and computer applications, modifying the curriculum to meet changes in technology, and computer applications in agriculture among their top five items. The Missouri teachers with 6 to 15 years of teaching experience also included these three items in their top three, while Kansas teachers in that experience group, and beginning teachers in both states placed less emphasis on the need for professional development pertaining to technology. A clear message is being sent by the more veteran groups of teachers that professional development opportunities in computer technology are needed. The decreased emphasis of these items by the youngest group of teachers is likely a result of their greater exposure to such technology during their preservice programs.

Considering the mean scores of the highest rated items for the entire group of teachers, no item had a mean above 4.0, indicating a strong need for professional development in either state. The absence of scores above 4.0 leads one to consider whether the correct items were considered, or were teachers generally prepared in the areas addressed by the items included. On the questionnaire, an open-ended item asked respondents to suggest topics for professional development not included on the instrument. Of the 139 instruments returned in Kansas, only seven other topics were suggested. Three of those seven comments related to modifying the curriculum to meet increasing state academic requirements for college admission. This would imply that an item pertaining to this topic should be included in future needs assessments in Kansas. Seven other topics were also suggested among the 348 instruments returned in Missouri, but none were identified by more than one respondent. Thus implying the instrument adequately represented topics for professional development for Missouri teachers.

When planning professional development activities, state professional development planning teams in each state should use these results to prioritize and plan their professional development offerings for teachers. In determining topics to address, clearly a concern exists among teachers in both states for professional development activities in the areas of: writing grant proposals for external funding, modifying the curriculum to meet changes in technology, and designing and modifying curriculum and course offerings to attract high quality students. These items should be made top priorities for future professional development opportunities for teachers. Additionally, Kansas teachers expressed a clear need for assistance in the area of preparing proficiency and degree applications while Missouri teachers exhibited a stronger need for professional development related to computer technology and computer applications. Certainly, these two number one ranked items in each state deserve immediate attention within their respective states.

Although several of the professional development topics included in this study received similar attention from teachers in the two states, Kansas and Missouri teachers ranked eleven items considerably differently. This fact alone sufficiently negates the argument that professional development needs assessment findings for teachers in one state can be applied wholesale to teachers in similar states.

Although needs assessment findings from other states can definitely assist state leaders in refining their own potential lists of professional development topics, sufficient differences exist between states to warrant individual periodic needs assessments in each individual state. Differences in the areas of preservice education, inservice programs and delivery systems, curricular topics, agricultural enterprises, funding structures, and teacher backgrounds and demographics within states, necessitate the careful assessment of professional development needs and desires of teachers on a state-by-state basis. To garner the greatest results from the extensive time and resources required to plan and deliver professional development activities, those activities should be made meaningful to teachers within the state by involving them in the process of identifying the most critical topics to be addressed.

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Agricultural Educator's Knowledge and Perceptions of Agricultural Biotechnology Curriculum

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Abstract

Recent legislation encourages the integration of academic content in agricultural education. In North Carolina, high school agricultural education programs can now choose to offer a state adopted integrated biotechnology curriculum. The purpose of this study was to identify and describe factors related to the intent of agricultural educators to adopt this curriculum in order to assist teachers during this transition of curriculum adoption.

North Carolina agricultural educators were randomly surveyed to determine their self-perceived level of knowledge, actual level of knowledge and perceived importance of integrated science competencies in the new North Carolina Biotechnology and Agriscience Research course. This descriptive and correlational study also described how agricultural educators perceived the course in fulfilling program needs, perceived barriers to teaching the course, and the likelihood of agricultural educators in North Carolina adopting the course. Exploratory research was conducted to identify factors that best predicted the intent of agricultural educators to adopt the course.

Agricultural educators accurately perceived that they lack the knowledge to teach the Biotechnology and Agriscience Research course but support the importance of teaching biotechnology and recognized the benefits of integrated curriculum in agricultural education. Agricultural educators perceived that the exterior factors of funding, equipment and teacher knowledge are the largest barriers to adopting integrated science curriculum. Teachers who are most likely to adopt the Biotechnology and Agriscience Research course have fewer years of teaching experience, have attended some biotechnology training and perceive integrated biotechnology curriculum will fulfill their agricultural education program needs.

Introduction

In recent years, curriculum integration of science and agriculture has accelerated due to the biological revolution that requires the agriculturist to understand more science. Martin, Rajasekaran & Vold (1989) reported that students of agriculture must learn the biosciences, as they are the foundation of the industry of agriculture. The integration of agriculture and science curriculum has also been inspired by educational reform legislation. Since the mid-1930s the United States Department of Education has endorsed the integration of vocational and academic studies (Moss, 1990). Horne and Key (1993) reported that biotechnology is one subject area that readily integrates science and agriculture.

In 1999, North Carolina education and industry experts developed a course titled "Biotechnology and Agriscience Research" based on the standards identified in "The National Voluntary Occupational Skill Standards for an Agricultural Biotechnology Technician". The Biotechnology and Agriscience Research course reflects the theory of the reinforcement model of integration by infusing academic content into vocational education curriculum. The National Agricultural Education Council sponsored the development of an accompanying curriculum guide titled "Biotechnology for Plants, Animals, and the Environment" that is now available to secondary agricultural education programs nationwide.

North Carolina high schools can now offer a state adopted integrated agricultural biotechnology course that has been developed as a cooperative effort between industry and education. It is not known whether teachers in the state will adopt this innovative course as a part of their local course offerings. North Carolina agricultural educational consultants need empirical evidence to identify factors related to the intent of agricultural educators to adopt this curriculum in order to assist teachers in the future transition of curriculum adoption. Rudd and Hillison (1995) reported that data related to the adoption of agriscience curriculum could provide insight for agricultural education curriculum efforts in the future.

Theoretical Framework

The theoretical framework for this study was derived from a review of the existing literature regarding motivation theory. The intent of teachers to adopt integrated curriculum is directly related to this area of psychological theory. Finch, Schmidt and Faulkner (1992) emphasized the importance of motivational theory to the educational movement of curriculum integration when they stated, "teachers must ultimately have the need and desire to integrate vocational and academic education. You can lead teachers to school, but you cannot make them integrate" (p.11).

Edwin Locke's schema of motivation in Figure 1 was chosen as the theoretical framework for this study because it encompasses a combination of the most well-known and accepted motivation theories and puts them in a logical sequence. In this sequence, Locke (1991) hypothesizes that the motivation theories support one another and the weaknesses they possess when alone are diminished.

Locke (1991) stated, ". . . the field of work motivation has become increasingly confused over the past decades. The major cause of confusion has been a plethora of theories and paucity of frameworks for integrating them. A major but seldom-recognized reason for the difficulty is that most of the theories pertain to different aspects of the motivational sequence" (p.288).

Studies exist that suggest that agricultural educators perceive a need for integrated biotechnology curriculum. Brown, Kemp and Hall (1998) reported that 69% of the science, technology education and agricultural education teachers in Kentucky supported a need for teaching integrated biotechnology curriculum in their schools. Agricultural educators who had participated in the National FFA Agriscience Teacher of the Year at the state and national level perceived a need for the integration of science into agricultural education according to Thompson (1998). They believed that by integrating science into agricultural courses, students had a better understanding of science concepts and their application in agriculture.

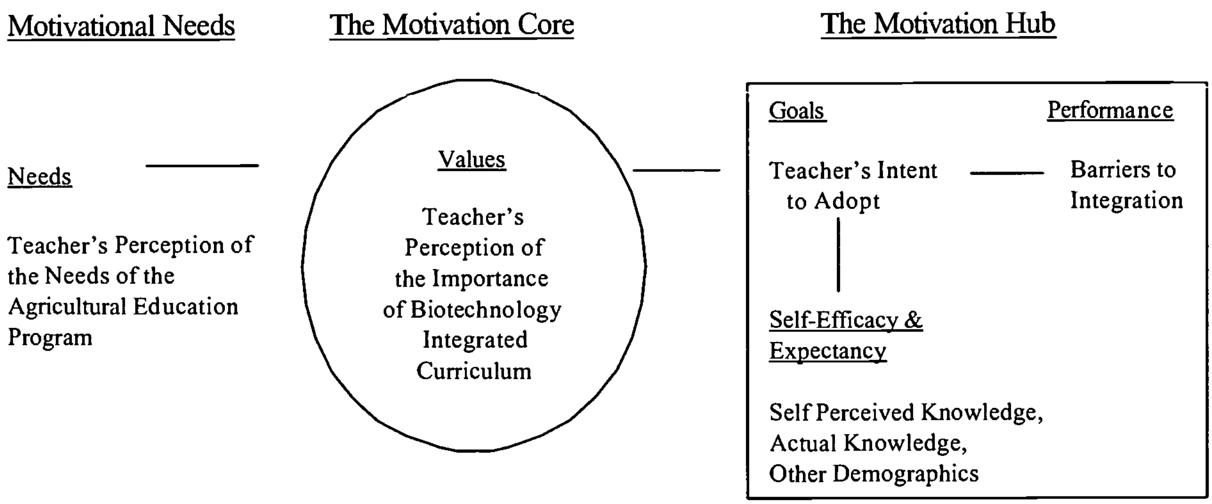

Figure 1. Application of Locke's Motivation Sequence to the Intent of Agricultural Educators to Adopt Integrated Biotechnology Curriculum.

Several studies have found an agricultural educator's perceived value of a curriculum is a meaningful predictor of the adoption of curriculum. Rudd and Hillison (1995) found that a teacher's expectations of an agriscience curriculum was a moderate predictor of the amount of agriscience curriculum that was adopted in agricultural middle school programs in Virginia. Although some studies conclude that the integration of science is valued, not all research concludes that this is the case. Bottoms, Presson & Johnson (1992) found that only one in ten vocational teachers believed it is important to teach science concepts in an applied manner and only two in ten reported that they could do it well.

Newman and Johnson (1994) found that, in Mississippi, teachers perceived the importance of biotechnology in their Agriscience I course to be very important, but they also felt they possessed the lowest competence in this area. Rudd and Hillison (1995) researched the adoption of a new middle grade agriscience curriculum in Virginia. They found that that the self-perceived knowledge of agriscience middle grade agricultural teachers in Virginia was the best predictor of 13 variables to predict the amount of the agriscience curriculum that was adopted and taught. Thompson and Balschweid (1999) found that 84% of the agricultural educators in a study of Oregon Agricultural Science and Technology teachers had attended at least one integration workshop and 72% of these respondents indicated that they strongly agreed or agreed that they felt prepared to teach integrated biological concepts. This high rate of self-perceived ability might be related to the fact that all the agricultural educators had received some training.

Roberson, Flowers, and Moore (1997) concluded that a lack of teacher support for educational reform in North Carolina might be due to the many barriers teachers perceive in integrating vocational and academic curriculum. These perceived barriers are important to integration efforts as Pritz and Davis (1990) reported the reluctance of teachers to change as a result of these perceptions as suggested by expectancy theory. Thompson and Balschweid (1999) found that Oregon agricultural educators surveyed felt that lack of equipment, training and funding were significant barriers to integrating science in agricultural education. Many other studies (Roberson, Flowers & Moore, 1998; Thompson & Schumacher, 1997; Newman & Johnson, 1994) have also found that teachers perceive a lack of agriscience training as a barrier to integrating agriscience in agricultural education.

Purpose of the Study

The purpose of the study was to identify and describe factors related to North Carolina high school agricultural teachers' intent to adopt integrated agricultural biotechnology curriculum. The study intended to answer the following research questions:

1. What is the self-perceived level of knowledge possessed by agricultural educators of integrated science competencies in "Biotechnology and Agriscience Research"?
2. What is the actual level of knowledge possessed by agricultural educators of integrated science competencies in "Biotechnology and Agriscience Research"?
3. How do North Carolina agricultural educators perceive the importance of "Biotechnology and Agriscience Research" competencies in agricultural education?
4. Which agricultural education program needs do agricultural educators perceive "Biotechnology and Agriscience Research" will fulfill?
5. What is the intent of agricultural educators to adopt the "Biotechnology and Agriscience Research" course within the next six years?
6. What barriers do agricultural educators perceive to exist in teaching the "Biotechnology and Agriscience Research" course?
7. If barriers were not present, what is the best predictive model for the dependent variable of the intent of agricultural educators to adopt the "Biotechnology and Agriscience" course as related to the following independent variables: agricultural educators actual level of knowledge of the integrated biotechnology competencies, self-perceived level of knowledge of the integrated biotechnology competencies, perceived importance of the integrated biotechnology competencies, perceived fulfillment of program needs and the demographic factors of age, gender, number of years of teaching experience and number of completed formal biotechnology courses or workshops?

Research Procedures Used

This was a descriptive/correlational study using responses from randomly selected agricultural teachers in North Carolina during the spring of 2000. A sample size of 173 from 313 teachers was determined using Cochran's formula for estimating sample size to determine the sample of a finite population (Cochran, 1977).

The instruments were reviewed by a panel of experts for content validity and pilot tested by 17 teachers who were not in the pool of randomly selected teachers. The reliability of the actual knowledge instrument was measured using the Kuder-Richardson 20 coefficient of internal consistency (Gall, Borg, and Gall, 1996). A Kuder-Richardson 20 coefficient of .81 was derived from the 35 test items. All of the multiple choice actual knowledge test items were considered reliable and were retained in the instrument. The stability of the questions related to teachers' perceptions were measured using the Product-Moment Correlation Coefficient (Pearson r). The initial perception pilot responses and the perception pilot responses received two weeks later resulted in a coefficient of stability of $r = .83$. The perception questions were considered stable and were not revised.

The total response rate was 73% (n=126). According to Gay (1980) a response rate of 70% or higher reduces the risk of nonresponse error. Early and late respondents were compared as the basis for controlling non-response error. According to Miller and Smith (1983), late respondents are similar to non-responders. A comparison of mean differences of the knowledge test between the two response groups resulted in t=1.55, df=1.24, p=. 124 (no significant difference). Thus, the late respondents were included in the total response pool and the resultant responding sample was assumed to be representative of the target population.

The statistical analyses used to interpret the data included descriptive statistics and correlational statistics. Descriptive statistics were used to determine the mean and measure of variance (standard deviation) of the perceived knowledge of agricultural educators of integrated science competencies in the Biotechnology and Agriscience Research course, their actual knowledge of integrated science objectives in the Biotechnology and Agriscience Research course, the needs they perceived that the Biotechnology and Agriscience Research course would fulfill, their perceived value of integrated science competencies in the Biotechnology and Agriscience Research course, and the barriers they perceive exist in teaching the Biotechnology and Agriscience Research course.

Multiple regression analysis was used to determine the best model for explaining the variance associated with the intent to adopt the Biotechnology and Agriscience Research course by a linear combination of the independent variables. Stepwise elimination was used to determine the multiple regression model that best explained the dependent variable of the intent to adopt.

Findings

Demographics of participants measured by the study were teaching experience, age, gender and previous training. The mean total years of teaching experience of the respondents was 13.34 years. Twenty six percent of the respondents had less than 5 years of total teaching experience and 12% of the respondents had more than 25 years of total teaching experience.

The mean age of the respondents was 39.27 years. Twenty three percent of the respondents were less than 30 years old and 15% of the respondents were older than 50 years old. Males constituted 76% (n=96) and females constituted 24% (n=30) of the data sample. The mean number of biotechnology in-service activities or courses taken by the respondents was 1.27. Over forty three percent of all respondents had not attended any in-service or courses related to biotechnology.

1. What is the self-perceived level of knowledge possessed by agricultural educators of integrated science competencies in the Biotechnology and Agriscience Research course? Using a Likert scale of 1 to 4, with 1 representing very unfavorable perceptions and 4 representing very favorable perceptions, agricultural educators perceived they were somewhat knowledgeable (M=2.17) of competencies in the course (see Table 1). They perceived themselves to be least competent in nucleic acid techniques (M=1.65) and biochemistry concepts related to agriculture (M=1.84). They perceived themselves to be most competent in basic concepts of genetics (M=2.50) and the relationship of biotechnology to agriculture (M=2.52).

Table 1

Mean Responses of Self-Perceived Knowledge by Competency

Biotechnology and Agriscience Research Competencies	Mean	S.D.
Explore nucleic acid techniques used in agriculture.	1.65	0.79
Analyze basic concepts in biochemistry related to agricultural biotechnology.	1.84	0.83
Analyze basic concepts in microbiology related to agricultural biotechnology.	1.95	0.77
Analyze the potential social and environmental impacts of food biotechnology processes and products.	2.00	0.76
Examine techniques and biological processes in food science related to biotechnology.	2.03	0.76
Analyze the potential social and environmental impacts of environmental biotechnology processes and products.	2.11	0.84
Examine techniques and biological processes in environmental science related to biotechnology.	2.13	0.82
Analyze the potential social and environmental impacts of plant biotechnology processes and products.	2.31	0.76
Analyze the potential social and environmental impacts of animal biotechnology processes and products.	2.35	0.80
Examine techniques and biological processes in animal science related to biotechnology.	2.38	0.80
Examine techniques and biological processes in plant science related to biotechnology.	2.39	0.77
Analyze basic concepts in genetics related to agricultural biotechnology.	2.50	0.80
Analyze biotechnology and its relationship to agriculture.	2.52	0.72

2. What is the actual level of knowledge possessed by agricultural educators of integrated science competencies in "Biotechnology and Agriscience Research"? The mean test score for agricultural educators on a 35-item multiple-choice test was 24.09 (69%). More than 44% of the respondents answered less than 70% of the questions correctly.

3. How do North Carolina agricultural educators perceive the importance of "Biotechnology and Agriscience Research" competencies in agricultural education? The participant's overall mean importance response was 3.87 on a Likert scale of 1 to 5, with 1 representing very unfavorable perceptions and 5 representing very favorable perceptions, indicating they felt the competencies overall were important to agricultural education. As shown in Table 2, they perceived nucleic acid techniques ($\underline{M}$=3.28) and biochemistry concepts related to agriculture ($\underline{M}$=3.63) to be the least important.

Table 2

Mean Responses of the Perceived Importance of Each Competency

Biotechnology and Agriscience Research Competencies	**Mean**	**S.D.**
Explore nucleic acid techniques used in agriculture.	3.28	0.95
Analyze basic concepts in biochemistry related to agricultural biotechnology.	3.63	0.96
Analyze basic concepts in microbiology related to agricultural biotechnology.	3.72	0.90
Analyze the potential social and environmental impacts of environmental biotechnology processes and products.	3.79	0.94
Examine techniques and biological processes in food science related to biotechnology.	3.83	0.94
Analyze the potential social and environmental impacts of food biotechnology processes and products.	3.87	0.89
Examine techniques and biological processes in environmental science related to biotechnology.	3.89	0.85
Analyze the potential social and environmental impacts of animal biotechnology processes and products.	3.94	0.88
Examine techniques and biological processes in environmental science related to biotechnology.	3.89	0.85
Analyze the potential social and environmental impacts of animal biotechnology processes and products.	3.94	0.88
Analyze the potential social and environmental impacts of plant biotechnology processes and products.	4.00	0.97
Examine techniques and biological processes in plant science related to biotechnology.	4.03	0.98
Examine techniques and biological processes in animal science related to biotechnology.	4.06	0.89
Analyze basic concepts in genetics related to agricultural biotechnology.	4.11	0.90
Analyze biotechnology and its relationship to agriculture.	4.15	0.89

4. Which agricultural education program needs do agricultural educators perceive "Biotechnology and Agriscience Research" will fulfill? Agricultural educators felt that 6 of the 7 program needs would be

fulfilled by the Biotechnology and Agriscience course by responding with a mean response between 3.5 and 4.5 using a Likert scale of 1 to 5, with 1 representing very unfavorable perceptions and 5 representing very favorable perceptions as shown in Table 3. They did not feel that the course would appeal to or help students with lower academic abilities ($\underline{M}$=2.33).

Table 3

Mean Responses of the Perceived Program Need Fulfillment

Program Needs	**Mean**	**S.D.**
Appeal to and help students with lower academic abilities.	2.33	0.92
Help gain support of the local administration for agricultural education.	3.69	0.82
Provide my program with a course that will receive science credit.	3.82	0.96
Better prepare my students for a future career in agriculture.	3.86	0.76
Help my students make choices concerning controversial issues dealing with biotechnology.	4.03	0.80
Enhance the image of my agricultural education program.	4.06	0.70
Attract students with higher academic abilities.	4.07	0.85

5. What is the intent of agricultural educators to adopt the "Biotechnology and Agriscience Research" course within the next six years? Over half (53%) of all agricultural educators indicated they were likely to adopt the course, 29% indicated they were uncertain and 18% indicated they were not likely to adopt the course if barriers did not exist.

6. What barriers do agricultural educators perceive to exist in teaching the "Biotechnology and Agriscience Research" course? As shown in Table 4, using a Likert scale of 1 to 4, with 1 representing very unfavorable perceptions and 4 representing very favorable perceptions agricultural educators perceived equipment ($\underline{M}$=3.26) and funding ($\underline{M}$=3.08) to be the strongest barriers. Lack of curriculum ($\underline{M}$=2.99), knowledge ($\underline{M}$=2.82), and training ($\underline{M}$=2.75) were still perceived as barriers but not perceived to be as strong.

7. If barriers were not present, what is the best predictive model for the dependent variable of the intent of agricultural educators to adopt the "Biotechnology and Agriscience" course as related to the following independent variables: agricultural educators actual level of knowledge of the integrated biotechnology competencies, self-perceived level of knowledge of the integrated biotechnology competencies, perceived importance of the integrated biotechnology competencies, perceived fulfillment of program needs and the demographic factors of age, gender, number of years of teaching experience and number of completed formal biotechnology courses or workshops? Stepwise regression indicated that program needs fulfilled, training, and total years of teaching experience created the best fitting model to explain the dependent variable, intent to adopt. The model accounted for nearly 38% of the variance in North Carolina agricultural educators intent to adopt the course as shown in Table 5.

Table 4

Mean Response for Barriers to Adopting Biotechnology and Agriscience Research

Barriers To Adopting Biotechnology and Agriscience Research	Mean	S.D
Lack of administrative support	1.98	0.90
Lack of student interest	2.23	0.77
Not enough time to plan	2.60	0.86
Insufficient teacher inservice and training	2.75	0.90
Lack of teacher knowledge	2.82	0.86
Insufficient curriculum and textbooks	2.99	0.84
Lack of funding	3.08	0.87
Lack of equipment	3.26	0.84

Table 5

Best Fitting Predictive Model for Intent to Adopt the Biotechnology and Agriscience Research Course

Model	R	R Square	Adj. R Square	Std. Error
1	.531	.281	.276	1.84
2	.584	.341	.331	1.77
3	.612	.375	.359	1.73

Model 1 Factors: Program Needs

Model 2 Factors: Program Needs, Training

Model 3 Factors: Program Needs, Training, Teaching Experience (fewer years)

Conclusions

Agricultural educators accurately perceive that they lack the knowledge to teach the Biotechnology and Agriscience Research course. Nearly half of the agricultural educators surveyed were unable to pass a knowledge test created for high school students based on the Biotechnology and Agriscience Research course. The majority of agricultural educators are also aware of their lack of actual knowledge.

The majority of North Carolina agricultural educators have not participated in training related to biotechnology therefore they are ill prepared to teach concepts related to this emerging technology. Nearly half of all agricultural educators in North Carolina have never attended a biotechnology related course or inservice activity.

Agricultural educators support the importance of teaching biotechnology and recognize the benefits of integrated curriculum in agricultural education. Agricultural educators perceive that biotechnology related content is important and that by offering the course they will enhance the image of their program and better prepare students for the future. They also perceive that by teaching this curriculum their program will attract higher ability students and project a better image.

Agricultural educators perceive that the exterior factors of funding, equipment and teacher knowledge are the largest barriers to adopting integrated science curriculum. Recently, classroom and laboratory activities have been developed to teach the content of the Biotechnology and Agriscience Research course. Teachers are not aware that these new labs require less equipment and expense than those in older curriculum. Teachers do realize that they must possess knowledge of the content in order to teach the course.

The Biotechnology and Agriscience Research course has the necessary support of agricultural educators to propose its' continued inclusion in the North Carolina Workforce Development program of studies. The majority of agricultural educators in North Carolina intend to adopt the curriculum if exterior barriers are not present. New curriculum and resources are being developed that will overcome the perceived barriers of lack of funding and equipment.

Teachers who are most likely to adopt the Biotechnology and Agriscience Research course have fewer years of teaching experience, have attended some biotechnology training and perceive integrated biotechnology curriculum will fulfill their agricultural education program needs. These three independent factors created the best model for predicting agricultural educators' intent to adopt the course in this study.

Implications and Discussion

The results of this study are supported in the literature by Locke's (1991) motivational sequence (Figure 1) that encompasses several theories of motivation. The results of this study indicate if teachers perceive the integrated biotechnology curriculum will fulfill a program need, such as improving the image of the program, they are more likely to be motivated to adopt the curriculum. Just as Locke illustrated in the first step of the motivational sequence (Figure 1), a teacher must have a perceived need of the curriculum.

Next according to Locke's motivation sequence, teachers must value the curriculum before they will consider its adoption. In this study, agricultural educators indicated they did perceive the content of the course to be an important subject to be taught in agricultural education.

In Locke's motivational sequence (Figure 1), an agricultural educator's low self-perceived and actual knowledge as described by this study may prevent the teacher from carrying out or performing the goal of adopting the integrated curriculum. Locke hypothesized that the self-efficacy and expectancy of an individual can be determined by their perceived or actual lack of knowledge.

This study did not find perceived or actual knowledge to be a predictor of the intent to adopt curriculum as Rudd and Hillison (1995) found in a study of Virginia middle school teachers. North

Carolina agricultural educators may view their lack of knowledge as a factor that is stable and controllable, meaning they feel they possess the ability and administrative support to learn what they need to know to teach the course. Therefore, they possess the confidence to overcome this deficiency by attending training and studying the information.

North Carolina agricultural educators perceive that the Biotechnology and Agriscience Research course will fulfill many program needs but not all individual competencies are valued. Teachers were found to value the importance of individual scientific competencies into agricultural courses in many previous studies such as conducted by Brown et.al (1998) as in this study. This inconsistency of the value of integrated science curriculum indicates that individual inservice groups should be preassessed to determine their attitudes and value of specific competencies so they can be addressed in training.

Barriers to adopting integrated curriculum as identified by many researchers seem to continue to exist in North Carolina. However, North Carolina agricultural educators seem unsure whether administrative support or student interests are still barriers. Administrative support for this type course may have increased over the past several years due to recent state and federal legislation that encourages curriculum integration. Student interest may be increasing due to the attention biotechnology has recently received in the media.

The implications for this exploratory study should be hopeful and encouraging to those who are attempting to carry out federal and state legislation guidelines that encourage the integration of curriculum. Agricultural educators in North Carolina possess a favorable attitude or perceived value of integrated science curriculum and feel that the integrated curriculum will fulfill program needs. They perceive that funding and equipment barriers do exist; however, educational agencies can create classroom lesson plans and labs that require minimal equipment and funding. The most hopeful aspect of this study is that the majority of the teachers have been motivated enough by their program needs and perceived values to set the goal of adopting the Biotechnology and Agriscience course.

Recommendations for Further Research

The findings of this exploratory study lead to many recommendations for future research. More descriptive research should be conducted to determine if differences exist between each independent factor and agricultural educators' intent to adopt the Biotechnology and Agriscience Research course.

A study of the relationship between agricultural educators' actual knowledge of each competency and the value they place on each competency would provide more insight of the perceived value of the content of the course. The actual knowledge of agricultural educators should also be examined more closely to determine in what competency areas they are the most deficient. Graduate programs and other adult educators should carefully study and address these deficiencies and the andragogical processes needed to assist the more experienced teachers in developing self-efficacy and knowledge in these areas.

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Integrating Science into Agricultural Education: A Survey of South Carolina Teachers' Perceptions

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Abstract

The purpose of this study was to determine agriculture teachers' perceptions toward and barriers regarding the integration of science into South Carolina agricultural education. The target population of the study consisted of all secondary agriculture teachers in South Carolina. Results of the study showed that teachers believe they are prepared to teach biological and physical science concepts and that the greatest barriers regarding science integration include a lack of necessary equipment, funding, and in-service. Teachers also indicated the need for the agricultural teacher education program to teach undergraduates science integration concepts and indicated a need for increased in-service of science integration. Both statements align with the goals of the newly formed Department of Biology Instruction and Agricultural Education at Clemson University. Recommendations singled out the need for continued focus on collaboration between secondary agriculture and science teachers, access to funding opportunities, and revision of state curricular-equipment lists.

Introduction and Theoretical Framework

Over a decade has passed since the National Research Council's Committee on Agriculture (1988) recommended that agricultural education shift its emphasis from a largely vocational-based curriculum to one that more clearly integrates scientific thinking with traditional studies of production agriculture. This pedagogical approach has come to be known as agriscience, defined by Conroy and Walker (1998, p. 12) as "identifying concepts of biological, chemical, and physical science in the teaching of agriculture, and using agricultural examples to relate these concepts to the student." As educational reforms continue, the shift to teaching agriscience has occurred quite rapidly. Indeed, the change is clearly reflected in the use of the words "science" or "agriscience" in the titles of at least three popular secondary school agriculture textbooks (Burton, 1992; Cooper & Burton, 2002; and Herren, 2002). Hillison (1996) also notes that the shift to agriscience returns the focus of agricultural education to its original 1887 Hatch Act mission of promoting scientific agriculture, while reducing (but not eliminating) the emphasis on vocational programs that was ushered in by the Smith-Hughes Act of 1917. This balanced blend of conceptual agriscience and practical agriculture training is viewed by many as an ideal mix for agricultural education curricula (Shelley-Tolbert, Conroy, & Dailey, 2000).

The national report "Before It's Too Late" (2000) directed by John Glenn stressed the need for science in education, stating that "no one citizen of America can participate intelligently in his or her community or, indeed, conduct many mundane tasks, without being familiar with how science affects his daily life." While the increase in agriscience teaching was met with general approval from teachers, parents, students, and guidance counselors as well as the scientific and business communities it has also generated concern among agriculture teachers (Osborne & Dyer, 2000; Dyer & Osborne, 1999; AAAS, 1993; Stasz & Grubb, 1991; Secretary's Commission on Achieving Necessary Skills, 1991). A number of formal surveys have been conducted that specifically assess teachers' perceptions regarding the trend toward a more agriscience-oriented curriculum. These include surveys from Indiana (Balschweid & Thompson, 1999), Michigan (Connors & Elliot, 1994), Mississippi (Newman & Johnson, 1993; 1994), Ohio (Peasley & Henderson, 1992), Oregon (Thompson & Balschweid, 1999) and Texas (Norris & Briers, 1989), as well as surveys or other analyses done with a more national focus (Whent, 1994; Connors & Elliot, 1995; Thompson & Schumacher, 1998; Johnson, Wardlow, & Franklin, 1998; Shelley-Tolbert et al., 2000). In general, these studies identify the following common themes:

1. Many teachers feel that they did not receive adequate science coursework in college to teach agriscience effectively;
2. There is a shortage of in-service training available to make up for this lack of science knowledge;
3. There is a need for more interaction between agriculture and science teachers;
4. Teaching resources and institutional support for agriscience curriculum revision are not always available in needed amounts, and
5. Pre-service agricultural education curricula need to focus specifically on agriscience as a core theme. These programs also need to provide would-be teachers with practical experience in how to successfully integrate science with agriculture in the classroom.

At Clemson University, agricultural education and introductory biology teaching faculty were recently merged into a single department of Biology Instruction and Agricultural Education (BIAE). This unique partnership of biologists and agricultural educators has given the opportunity to begin revising undergraduate agricultural education curriculum with a new focus on agriscience. The ultimate goal of BIAE is to produce a new generation of secondary school agriculture teachers who are comfortable with agriscience in the classroom, and who are capable of teaching core science concepts throughout the agriculture curriculum. As the first step in this retooling effort, a survey of South Carolina agricultural education teachers was conducted to see how their opinions regarding agriscience matched or differed from the results of surveys from other states.

The need to determine South Carolina agriculture teachers' perceptions of science integration gives light to the theoretical base for this study. The theoretical frame for this study is grounded in Fishbein and Ajzen's (1975) planned behavior theory. They determined that attitudes, intentions, and behaviors could be predicted based upon knowledge, observation, or other information about an issue. Therefore, this theory would allow the researchers to suggest that agriculture teachers' intent to integrate science can be predicted by analyzing his/her beliefs (perceptions) towards this subject matter.

Purpose/Objectives

The purpose of this study was two-fold: 1) identify and describe the perceptions of South Carolina agriculture teachers toward the integration of science into secondary agricultural education and 2) identify barriers that might exist to this integration. The objectives of this study were as follows:

1. Describe the demographic characteristics of South Carolina agriculture teachers and their students;
2. Describe the perceptions of agriculture teachers toward the integration of science into agricultural education;
3. Describe the perceptions of agriculture teachers regarding barriers of integrating science into their agricultural education courses;
4. Describe the perceptions of agriculture teachers regarding teacher education programs as related to the integration of science into agricultural education, and
5. Describe the perceptions of agriculture teachers toward the integration of science into agricultural education regarding program support.

Methods/Procedures

The population for the study consisted of all secondary agriculture teachers in the state of South Carolina (N = 105). The list of agriculture teachers was obtained from the 2000-2001 South Carolina Directory of Agricultural Educators. Census populations were used, and as such, the findings from this study can only be generalized to the population.

The instrument used in the study – "Integrating Science Survey Instrument," was developed by Thompson and Schumacher (1997) and later modified by Balschweid and Thompson (1999). The instrument was also slightly modified to meet the objectives of this study. The participants in the study were asked to respond to 39 statements regarding the integration of science into agricultural education. Teacher responses were measured using a Likert-type scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. A panel of experts from the Department of Biology Instruction and Agricultural Education at Clemson University was asked to review the instrument for content and face validity. A post-hoc reliability analysis was calculated on the 39 questions regarding the integration of science for the beginning teachers. Cronbach's alpha for reliability was 0.86.

Data were collected by sending the instrument and cover letter to all teachers in the study during October 2000. A follow-up postcard reminder was mailed two weeks after the initial mailing, requesting completion and return of the instruments that were not yet returned. A complete second mailing to non-respondents was sent two weeks following the post card. The response rate for the study was 78/105 (74%). A t-test of the 39 statements regarding the integration of science into agricultural education revealed no significant differences between early and late respondents (Miller & Smith, 1983). Therefore, the findings of this study can be generalized to the entire population of agriculture teachers in South Carolina.

Statistical data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS 10.0) for Windows and Microsoft Excel 2000. Descriptive statistics (frequencies, means, and standard deviations) were also used to analyze the data.

Results/Findings

The first objective of the study was to describe the demographic characteristics of South Carolina agriculture teachers. The average number of years teaching was 16, and the most prevalent age group of respondents was 41-50 (30.3%), followed by the 51-60 age group (26.3%). Ninety-three percent of the respondents were male. Teachers reported that 21.5% of their students were female, 28.6% were minorities, 71.8% of their students were members of the National FFA Organization, and 77.6% had some form of Supervised Agricultural Experience (SAE).

The second objective of the study was to describe the perceptions of agriculture teachers toward the integration of science into agricultural education. Table 1 shows the survey statements that were intended to probe agriculture teachers' attitudes toward the integration of science into agricultural education. Responses are ranked on the basis of the Mean Score. Mean scores regarding the topic of teaching integrated science ranged from 3.36-3.81, with the highest-ranked statement being "I feel prepared to teach integrated biological science concepts." This statement had an agreement of 73.1% (57/78 respondents indicating that they agree or strongly agree). It should also be noted that this statement scored the highest in the Balschweid and Thompson (1999) study of Indiana Agricultural Science & Business Teachers and the Thompson and Balschweid (1999) study of Oregon Agricultural Science and Technology Teachers.

Table 1.

South Carolina Agricultural Educators' Perceptions of Teaching Integrated Science (N = 78)

Teaching Integrated Science	M	SD
I feel prepared to teach integrated biological science concepts.	3.81	.93
I feel prepared to teach integrated physical science concepts.	3.68	.96
I teach integrated science concepts in agricultural education that focus more on the biological science concepts than the physical science concepts.	3.65	.96
Integrating science into agriculture classes has increased my ability to teach students to solve problems.	3.60	.87
Integrating science into the agricultural education program requires more preparation time for me than before I emphasized integrated science concepts in my agricultural education program.	3.39	.95
I have integrated more science in the advanced courses than the introductory courses that I teach in agricultural education.	3.36	.90

Note. Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

The third objective was to describe the perceptions of agriculture teachers regarding barriers to integrating science into their agricultural education courses. Table 2 presents the perceived barriers to integrating science as perceived by South Carolina agriculture teachers. Mean scores ranged from 2.62-4.03, with the highest ranked mean statement being "The lack of appropriate equipment is a barrier to integrating science into the agricultural education program." This statement had an agreement of 75.7% (59/78 respondents indicated that they agreed or strongly agreed). It should be noted that the top three statements in this objective mirror the top three found in the Balschweid & Thompson (1999) study of Indiana Agricultural Science & Business Teachers and the Thompson and Balschweid (1999) study of Oregon Agricultural Science and Technology Teachers.

Table 2

South Carolina Agricultural Educators' Perceptions of Barriers to Integrating Science into Their Agricultural Education Program (N = 78)

Barriers to Integrating Science	M	SD
The lack of appropriate equipment is a barrier to integrating science into the agricultural education program.	4.03	.97
The lack of adequate federal, state, or local funds is a barrier to integrating science in the agricultural education program.	3.62	1.13
The lack of agriscience in-service workshops/courses for agricultural education teachers is a barrier to integrating science into the agricultural education program.	3.58	1.06
The lack of an integrated science curriculum is a barrier to integrating science into agricultural education programs.	3.55	.94
The lack of student preparation in science (prior to enrolling in agricultural education) is a barrier to integrating science into agricultural education programs.	3.21	1.01
The lack of science competence among teachers in agricultural education is a barrier to integrating science in agricultural education.	3.03	1.00
The lack of close proximity to high-technology firms is a barrier to Integrating science in agricultural education programs.	3.00	1.01
The lack of agriscience jobs in the local community is a barrier to Integrating science into agricultural education programs.	2.82	.99
The lack of a science teacher who is willing to help me integrate science concepts has been a barrier to integrating science in the agricultural education program.	2.62	1.02

Note. Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

The fourth objective of this study was to describe the perceptions of agriculture teachers regarding teacher education programs as related to the integration of science into agricultural education. Mean scores ranging from 3.31-4.21 (Table 3) expressed perceptions regarding teacher preparation programs concerning the integration of science. The highest mean score statement was "Teacher preparation programs in agriculture should provide instruction for undergraduates on how to integrate science," with 71/78 (91.1%) of respondents in the "agree" or "strongly agree" categories. Additionally, teachers indicated agreement on the statement "Teacher preparation programs in agriculture should provide in-service for teachers in the field on how to integrate science into their agricultural education program," ($\underline{M}$ = 4.15) with 72/78 or 92.3% responding.

Table 3

South Carolina Agricultural Educators' Perceptions of Teacher Preparation Programs Regarding Integration of Science Into Agricultural Education (N = 78)

Perceptions Regarding Teacher Preparation	M	SD
Teacher preparation programs in agriculture should provide instruction for undergraduates on how to integrate science.	4.21	.63
Teacher preparation programs in agriculture should provide in-service for teachers in the field on how to integrate science into their agricultural education program.	4.15	.69
Teacher preparation programs in agriculture should place student teachers with a cooperating teacher that integrates science into the agricultural education program.	3.77	.88
Teacher preparation programs in agriculture should require that students conduct their early field experience program with a teacher who integrates science into the agricultural education program.	3.49	.94
Teacher preparation programs in agriculture should require students to take more basic science courses.	3.41	1.02
Teacher preparation programs in agriculture should have a follow-up in-service activity that requires Agricultural Education teachers to cooperate with a science teacher in their district to integrate science into the curriculum.	3.31	1.14

Note. Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

The final objective of the study was to describe the perceptions of agriculture teachers toward the integration of science into agricultural education regarding program support. As can be seen in Table 4, mean scores of teacher perceptions regarding program support ranged from 3.21-3.47.

The highest mean score statement was "Science teacher support will increase if I integrate more science into the Agricultural Education program" with 40/78 (51.3%) of respondents in "agree" or "strongly agree" categories. It should be noted that two of the top three statements (local administrator support and school counselor support) found below were the same in the Balschweid & Thompson (1999) study of Indiana Agricultural Science &

Business Teachers and the Thompson and Balschweid (1999) study of Oregon Agricultural Science and Technology Teachers.

Table 4

South Carolina Agricultural Educators' Perceptions of Program Support Toward the Integration of Science Into Their Agricultural Education Program (N = 78)

Program Support	M	SD
Science teacher support will increase if I integrate more science into the Agricultural Education program.	3.47	.80
Local administrator support will increase if I integrate more science into the Agricultural Education program.	3.41	.80
School counselor support will increase if I integrate more science into the Agricultural Education program.	3.37	.87
Community support will increase if I integrate more science into the Agricultural Education program.	3.31	.79
Other teacher support will increase if I integrate more science into the Agricultural Education program.	3.23	.84
Parental support will increase if I integrate more science into the Agricultural Education program.	3.21	.84

Note. Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Conclusions/Recommendations/Implications

This study resulted in the following conclusions and recommendations. South Carolina agriculture teachers perceive (73.1% agreed or strongly agreed) they can teach integrated biological and physical science concepts in their agriculture courses. Many programs in South Carolina offer horticultural sciences and agricultural mechanics, which may lead to a higher comfort level in the physical and biological sciences. These facts may explain teacher ease incorporating a new subject, however the question still exists – why has this not occurred?

In order for agriculture programs to integrate science, identification of existing barriers is necessary. Teachers indicated that lack of equipment, funding and lack of in-service training were the greatest barriers that exist. These same barriers (as well as other categories) were noted in studies in other states by Thompson and Balschweid (1999) and Balschweid & Thompson (1999). Findings from this study were very similar to those conducted with Indiana Agricultural Science & Business Teachers and Oregon Agricultural Science and Technology Teachers, adding validity to their conclusions and recommendations. In past years, budgets for funding in agriculture programs have generally focused on purchase of traditional vocational agriculture equipment. Shifting some of the spending focus from traditional to agriscience-related equipment might serve as a viable solution (Agnew, Lipford, & Clements, 1993).

Another aspect of this study queried agriculture teachers' perceptions of the teacher education program at Clemson University relating to agriscience integration. Undergraduate education of agriscience concepts was found to have the highest priority ($\underline{M} = 4.21$) among teachers. This implies that teachers recognize the pre-service program must initiate change toward agriscience instruction systemically. However, teachers indicated another priority should be in-service programming ($\underline{M} = 4.15$). Both of these findings support the new mission of the Department of Biology Instruction and Agricultural Education as previously discussed.

Based on the findings of this study, the recommendations are as follows:

1. State equipment lists should include recommendations of specific agriscience-related equipment;
2. State-level funding should be appropriated to develop a planned program for in-service in agriscience for agriculture teachers;
3. Teacher education faculty at Clemson University should encourage pre-service students to develop equipment lists that consider agriscience concepts and applications;
4. Secondary agriculture teachers should consider funding from external sources, such as the Secondary Education Challenge Grants program funded by the United States Department of Agriculture;
5. Faculty in BIAE should develop an extensive program that offers regular in-service on agriscience concepts;
6. Faculty in BIAE should develop hands-on activities that use inexpensive supplies to ease funding concerns of agriculture teachers;
7. Faculty in BIAE should collaborate with faculty in the Agricultural Mechanics program at Clemson to develop undergraduate instruction and teacher in-services that promote teaching the process of physical science and not product in agricultural mechanics as suggested by Osborne (1992), and
8. In-service for agriculture teachers should include invitations for local biology/science teachers to encourage collaboration and resource sharing between programs.

The findings of this study warrant the following recommendations for future research related to the integration of science into agricultural education:

1. A longitudinal study of teacher attitudes and perceptions as opportunities are provided to agriculture teachers by BIAE faculty;
2. Faculty in BIAE should initiate a longitudinal study of undergraduate students in the program 1) prior to graduation to observe paradigms related to science integration and 2) following graduation concerning science integration as teachers;
3. Studies should be conducted on the efficacy of teacher in-service programs, and
4. Studies should be initiated to assess improvements in secondary agriculture students' learning through science integration.

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Perceptions Of Agricultural Education Teachers Toward Sustainable Agricultural Practices

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Abstract

The purpose of this study was to determine the perceptions of selected agricultural education teachers toward sustainable agricultural practices. Teachers' perceived levels of knowledge regarding sustainable agricultural practices were also examined, along with sources of information they used related to sustainable agriculture. The population included all agricultural education teachers in the state who taught the Agricultural Production and Management curriculum ($\underline{N}$ = 92). The results of the study showed that agricultural education teachers had generally positive views related to sustainable agricultural practices, especially as they related to environmental issues. However, concerns did exist about the amount of labor and management required to implement sustainable agricultural practices and whether sustainable agricultural practices were cost effective. Teachers perceived themselves as knowledgeable concerning sustainable agricultural practices, most often preferring to receive information on the subject from farm magazines and from information available from land-grant universities. Agricultural education teachers who had participated in five or more sustainable agriculture activities had significantly higher perceptions of sustainable agriculture on some items than those who had attended fewer than five activities.

Introduction/Theoretical Framework

Agricultural education teachers have the dual responsibility of imparting knowledge about agricultural subjects, as well as helping learners solve problems and build personal skills required to be productive members of society. To achieve this end, they have to first identify and develop an effective strategy for disseminating agricultural subject matter. Agricultural knowledge, so developed, has the potential to satisfy the needs of the learner, the agricultural society, and the larger society. In order to succeed in this endeavor, agricultural education teachers need a complete understanding of the agricultural industry and how it impacts the environment (Birkenholz and Craven, 1996).

The application of modern agricultural science and technology has contributed to increased productivity of American agriculture in the last half-century. The successes of American agriculture, however, have been accompanied by many ecological problems. Today, both rural and urban inhabitants feel threatened by dangers posed to the environment by modern agricultural practices such as the heavy use of chemicals. An alternative farming strategy called sustainable agriculture promises remedies to the problems created by industrialized chemical-based agriculture—if sustainable agriculture can be shown to be viable and becomes widely accepted (Stauber, Hassebrook, Bird, Bultena, Holgberg, MacCormack, & Menanteau-Horta, 1995).

The concept of sustainable agricultural practices is of concern for farmers, extension agents, agricultural education teachers, and others working in agricultural related occupations. Sustainability requires a holistic approach in order to understand the whole as an aggregation of interwoven parts working together (Hartfield & Karlen, 1994). The performance of sustainable agricultural practices is judged not in terms of how each practice works separately, but in terms of how the individual practices fit together and relate to each other, and how the systems that result relate to their environment and to other systems in the environment. While this is an important topic; there has been little opportunity for professionals to convene and discuss issues related to sustainability and to sustainable agriculture (Roling & Wagemakers, 1998).

The role of the agricultural education teacher in the community in the context of a changing agricultural environment and an increasingly informed consuming public demands that a teacher's skills, attitudes, and perceptions conform to the context of the cultural change (Somers, 1998). Agricultural education teachers have the knowledge and skills for preparing students to become agriculturists who will pass on knowledge to future generations through teaching and practicing the principles acquired at school. Their role becomes increasingly important when coupled with the fact that the number of people in the United States and the rest of the world who participate in and understand agriculture is shrinking (Birkenholz & Craven, 1996). Those who understand and participate in sustainable agricultural activities are even fewer. Thus, the role of agricultural educators is becoming increasingly important as the need for agricultural literacy becomes more urgent and public concern about food safety and environmental sustainability increases. In addition, agriculture teachers have the potential to create awareness of sustainable agriculture practices among students and their communities and raise interest in the use of sustainable agriculture practices. Agriculture teachers are regularly sought for advice in the farming community since they are thought to be exposed to direct information sources through land grant universities (Lionberger & Gwin, 1982).

Agriculture teachers need a greater understanding of sustainable agricultural practices, as well as leadership and support at both state and national levels in agricultural education in teaching this topic in the public schools. According to Nunnery (1996), agriculture teachers must build a framework for understanding agriculture from a variety of perspectives and sensitize their students and the farming community around their schools to the history of agriculture and its impact on land, the environment, and to human welfare. The agricultural industry realizes that sustainable agricultural practices are applicable in many settings. However, there are limitations on the teaching of sustainable agricultural practices, including lack of an appropriate curriculum and instructional materials (Straquadine, 1997).

The theoretical basis for this study was taken from work done by Hartfield and Karlen (1994), who suggested that emphasis must be placed on education in order to effect behavioral changes. Their work suggested that the transition from conventional to sustainable agricultural systems required a shift in values and adjustments in institutional and organizational arrangements in agriculture. Just as an increase in education in agriculture facilitated the transition from subsistence agricultural systems to commercial agricultural systems, an increase in literacy must be among the intervention strategies to be utilized in initiating a self-sustaining growth for the transformation of agriculture to sustainable agricultural practices. A more literate population is less likely to rely on tradition as the dominant factor to justify a particular action and will be more likely to invoke rational decision making approaches. The agricultural education teacher is seen as an important factor in providing the appropriate education on this subject.

Previous research in this area shows that perceptions of agricultural educators may play an important role in the adoption of sustainable agricultural practices. A study by Conner and Kolodinsky (1997) of New England extension agents who had attended a conference on sustainable agriculture found that preconceived opinions of the participants had a large influence on the perceived usefulness of the information presented at the conference. Agunga (1995) found that a majority of extension agents in Ohio felt they should not be expected to provide information on sustainable agriculture to farmers. In doing so, they felt their credibility would be undermined. In a study involving agriculture teachers in 18 states, Straquadine (1997) found that agriculture teachers had positive opinions toward many sustainable agriculture concepts, but he concluded that agricultural education teachers needed to be trained in the use of printed materials on sustainable agriculture and needed to be provided follow up and support in the classroom and laboratory. Whent (1997) concluded that high school students who participated in a sustainable agriculture project involving hands-on experiences developed positive attitudes toward sustainable agriculture. Minarovic (1995) found that extension agents in North Carolina had an overall positive attitude toward sustainable agricultural practices.

Secondary agricultural education teachers are expected to serve as change agents in their agricultural communities and to provide information to their students on changing concepts in agriculture, as well as current issues. However, little is known about their perceptions of this growing movement toward sustainable agricultural practices.

Purpose and Objectives

The primary purpose of this study was to determine the perceptions of agricultural education teachers toward sustainable agricultural practices and the implications of their perceptions toward the dissemination of sustainable agriculture information. A secondary purpose of the study was to determine the level and sources of information about sustainable agricultural practices among the selected agricultural education teachers. The link between the primary and secondary purposes was established by determining how the level of knowledge and the sources of information were related to agricultural education teachers' perceptions toward sustainable agricultural practices. The following research questions provided a focus for the study:

1. How do agricultural education teachers perceive sustainable agricultural practices?
2. What is the self-perceived level of knowledge of agricultural education teachers on the topic of sustainable agricultural practices?
3. What sources of information are used by agricultural education teachers for sustainable agricultural topics?
4. What demographic characteristics of agricultural education teachers would influence their perceptions toward sustainable agricultural practices?

Methodology

This study utilized a descriptive research design to enable the researchers to describe the perceptions of agricultural education teachers toward sustainable agricultural practices. Factors proposed to have influenced these perceptions were explored to determine their degree of influence on the teachers' perceptions of sustainable agriculture. These factors included (a) agricultural education teachers' level of knowledge about sustainable agricultural practices, (b) their degree of use of sources of sustainable agricultural information, (c) sustainable agricultural practice in their agricultural education programs, (d) their fields of specialization in college, and (e) the number of educational activities on sustainable agricultural practices they had attended.

The population for this study consisted of the agricultural education teachers in the state who were teaching Agricultural Production and Management courses ($N = 92$). The list of teachers who were teaching the Agricultural Production and Management curriculum was provided by the state agricultural education staff. Those teachers were included in the population because the curriculum included both livestock and crop production practices and were most likely to influence sustainable agriculture practices in their communities. The entire population was surveyed.

Information from the review of the literature was used to develop the questionnaire used in this study. Extension Associates working in the area of sustainable agriculture at two land grant universities assisted with the development of the questionnaire, assuring content validity. The instrument was pilot tested for clarity and reliability, using agriculture teachers from Virginia. The Cronbach's Alpha coefficient of internal consistency for the items measuring the teachers' perceptions toward sustainable agriculture was .64. Minor revisions were made to the questionnaire to improve clarity, and two items were deleted to improve the internal consistency of the instrument. The instrument assessed the agriculture teachers' (a) perceptions toward sustainable agriculture practices, (b) perceptions of their knowledge level of sustainable agriculture practices, (c) degree of usage of information about sustainable agriculture, and (d) inclusion of sustainable agriculture practices in their curriculum.

The questionnaire was distributed to the agriculture teachers who taught the Agricultural Production and Management curriculum at the annual summer conference for agricultural education teachers. Teachers who were not present at the conference or who failed to complete the questionnaire at the conference were mailed a questionnaire following the conference. Two telephone follow-ups and one mailed follow-up of nonrespondents resulted in 80 responses, or 85% of the population. Due to the high response rate, nonresponse error was not a concern (Gall, Borg, and Gall, 1996).

Descriptive statistics were used to describe the data, including percentages, mean scores, and standard deviations for individual items. Analysis of variance was used to determine if agriculture teachers' perceptions about sustainable agricultural practices were significantly different based on their areas of college specialization and the number of sustainable agricultural education activities they had attended.

Results

The agricultural education teachers in this study were asked to describe their perceptions of sustainable agricultural practices on a scale of 1 to 5, with 5 representing very favorable perceptions, and 1 representing very unfavorable perceptions (see Table 1). Negatively stated

Table 1

Perceptions Toward Sustainable Agricultural Practices

Sustainable agricultural perception	M	SD
Sustainable agricultural practices may require additional management beyond conventional practices[a]	1.91	0.83
There may be insufficient labor for the workload required in sustainable agricultural systems.[a]	2.42	1.03
Economic gains when employing sustainable agricultural practices are not convincing[a]	2.57	0.82
Net farm income may decrease when a producer implements sustainable agricultural practices[a]	2.73	1.01
Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term.[a]	2.74	0.99
Recommended practices in sustainable agriculture have not been embraced by mainstream agriculture.[a]	2.78	1.07
The slow rate of adoption is due to lack of motivation among farmers.[a]	2.97	1.05
The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them.[a]	3.03	1.14
Recommended sustainable agricultural practices are not new and only need refinement to increase profit and protect the environment.	3.45	0.74
Sustainable agricultural systems should produce an adequate food supply to feed the world population.	3.56	1.06
An advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers.	3.62	0.86
Environmental balance is one basis for sustainable agricultural practices.	3.83	0.62

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree
[a]Negatively stated item was reverse coded for analysis.

items were reverse-coded for analysis. Therefore, mean scores above 3.0 indicate more positive perceptions of sustainable agricultural practices, while mean scores below 3.0 indicate more negative perceptions of sustainable agriculture. Environmental concerns of agricultural education teachers resulted in the areas of strongest support for sustainable agricultural practices. Over 80% of the teachers agreed or strongly agreed that environmental balance provided a strong basis for use of sustainable agricultural practices. In addition, 72.7% of the teachers also agreed or strongly agreed that the use of chemical fertilizers could be reduced with the use of sustainable agricultural practices. The teachers in this study were not concerned about sustainable agriculture's effect on the world food supply. Less than 20% of the teachers in the study disagreed or strongly disagreed that sustainable agricultural systems had the ability to produce an adequate food supply to feed the world population. The teachers did have concerns with some of the economic aspects of sustainable agricultural practices. Over 90% of the respondents agreed or strongly agreed that additional management practices are required when using sustainable agricultural systems. Also, 70% of the teachers felt that there may be insufficient labor available to meet the demands of sustainable agricultural systems. Slightly over half the teachers felt the potential economic gains from sustainable agricultural practices were not convincing.

Agricultural education teachers' self-perceived levels of knowledge of specific sustainable agricultural practices were assessed by asking teachers to respond on the following scale: 1 = Not informed; 2 = Slightly informed; 3 = Moderately informed; 4 = Well informed; and 5 = Highly informed. As shown in Table 2, agricultural education teachers in this study, as a whole, reported they were above the Moderately informed category for each of the sustainable agricultural practices identified.

Table 2

Agricultural Education Teachers Self-Perceived Knowledge of Sustainable Agriculture Practices

Practice	M	SD
Nutrient management plan which is a best management practice for improving water quality.	3.34	0.93
Animal production systems that emphasize disease prevention.	3.43	0.98
Crop rotations that reduce weed, disease, and pest problems	3.66	0.87
Integrated pest management practices that reduce the need for pesticides.	3.68	0.85
Scouting the field to determine if weed and insect control are needed.	3.70	0.86
Crop rotations that increase soil nitrogen and reduce the need for purchased fertilizers.	3.71	0.90
Crop rotations that reduce soil erosion.	3.95	0.78
Conservation tillage practices that reduce soil erosion and conserve water.	4.00	0.74

Note: 1 = Not informed; 2 = Slightly informed; 3 = Moderately informed; 4 = Well informed; 5 = Highly informed.

The agricultural education teachers were asked how often they used several potential sources of information about sustainable agricultural practices. The mean scores reported in Table 3 were computed from responses reported on a five-point scale, ranging from 1 = Never and 5 = Always for each of the potential sources of information. The most frequently used sources of information about sustainable agriculture were farm magazines, with 64.9% of the teachers reporting they frequently or always used farm magazines as their source of information about sustainable agricultural practices. Slightly over half the teachers reported using information on sustainable agriculture from land-grant universities at least on a frequent basis. County extension agents and publications received from county extension offices were used frequently or always as a source of sustainable agriculture information by 41.6% of the agriculture teachers in this study. Private agriculture consultants were seldom used by agriculture teachers as a source of information on this topic.

Table 3

Sources of Sustainable Agriculture Information

Potential Source	Never	Seldom	Sometimes	Frequent	Always	M	SD
Private Ag. Consultants	24.7	42.9	19.5	7.8	5.2	2.26	1.08
Agribusiness Dealers	2.6	24.7	36.4	33.8	2.6	3.09	0.89
Area Extension Specialists	2.6	24.7	32.5	29.9	10.4	3.21	1.02
Soil Conservation Service	1.3	18.2	39.0	33.8	7.8	3.29	0.09
Other Ag. Ed. Teachers	2.6	13.0	41.5	32.5	10.4	3.35	0.93
County Extension Agents and Publications	0.0	9.1	49.4	36.4	5.2	3.38	0.75
Land Grant Universities	0.0	11.7	35.1	46.8	6.5	3.48	0.79
Farm Magazines	0.0	3.9	31.2	55.8	9.1	3.70	0.69

Participants in this study were drawn from several agricultural disciplines. The largest number of teachers had concentrated their undergraduate studies in the area of animal science (40.3%), followed by 20.8% in the area of horticultural science. Fewer teachers reported their agricultural specializations as crop science (10.4%) and soil science (3.9%). Several teachers reported a dual focus for their agricultural studies, combining disciplines such as agricultural engineering, agricultural economics, and biological sciences with animal science, horticultural science, or crop science disciplines. For the purpose of determining if the primary agricultural discipline of the teachers influenced their perception of sustainable agriculture, teachers were grouped into the following discipline areas: (a) animal science, (b) horticultural science, (c) crop science, (d) soil science, and (e) other disciplines, including combinations of disciplines. Results of analyses of variance tests showed no difference in perceptions of agriculture teachers on sustainable agricultural principles based upon agricultural disciplines studied in college.

Of the 77 teachers who provided data for this item, 72 had attended at least one educational activity on the subject of sustainable agriculture. The largest number of teachers (39%) had attended only one educational activity on the subject, but the majority of the teachers had attended more than one activity. Almost 25% of the teachers had attended five or more educational activities in which the focus was on sustainable agricultural practices. For the purpose of examining possible effects of participating in educational activities on the teachers' perceptions of sustainable agricultural practices, teachers were divided into four groups, based upon attending educational activities related to sustainable agriculture: (a) those who had attended no educational activities, (b) those who had attended only one educational activity, (c) those who had attended from 2 to 4 educational activities, and (d) those who had attended 5 or more educational activities. For 10 of the 12 perception items, no difference in the perceptions of agricultural education teachers toward sustainable agricultural practices was found based upon the number of educational activities they attended. Teachers who had attended five or more educational activities did have significantly more positive perceptions of sustainable agriculture than teachers who had attended from two to four educational activities for two items. Teachers who had attended five or more sustainable agriculture education activities felt more strongly that pest control methods recommended in sustainable agriculture systems would not result in increased pest problems in the long term than those who had attended 2-4 activities. Also, teachers who had attended five or more activities felt more strongly that the slow rate of adoption of sustainable agricultural practices was not the result of lack of motivation among farmers.

Conclusions, Discussion, and Recommendations

Based upon the findings of this study, the following conclusions have been developed:

1. Agricultural education teachers who teach the Agricultural Production and Management curriculum in this state have overall positive perceptions of sustainable agricultural principles and practices, especially when related to the potential for sustainable agriculture to improve the environment. However, they have less positive perceptions on the economic feasibility of sustainable agricultural practices.

2. Agricultural education teachers who have the most potential to teach sustainable agricultural concepts to their students believe themselves to be knowledgeable concerning sustainable agricultural practices. Therefore, agricultural education teachers should not be reluctant to teach sustainable agriculture principles based upon a lack of knowledge of the subject.

3. Agriculture education teachers receive information on sustainable agriculture from a variety of sources. Farm magazines and information from land-grant universities are important sources of information on sustainable agriculture for agricultural education teachers.

4. Perceptions of agricultural education teachers regarding sustainable agricultural practices are not influenced by the agricultural discipline in which they focused their studies as a part of their degree programs.

5. With minor exceptions, the number of workshops or educational activities attended by agricultural education teachers did not influence their perceptions of sustainable agricultural practices.

Table 4

Differences in Perceptions of Sustainable Agriculture Based Upon Number of Educational Activities Attended

Sustainable agricultural perception	F	p
Sustainable agricultural practices may require additional management beyond conventional practices[a]	0.25	0.86
There may be insufficient labor for the workload required in sustainable agricultural systems. [a]	1.45	0.23
Economic gains when employing sustainable agricultural practices are not convincing[a]	1.41	0.25
Net farm income may decrease when a producer implements sustainable agricultural practices[a]	0.11	0.95
Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term. [a]	3.81	0.01
Recommended practices in sustainable agriculture have not been embraced by mainstream agriculture. [a]	2.61	0.06
The slow rate of adoption is due to lack of motivation among farmers. [a]	2.89	0.04
The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them. [a]	0.55	0.65
Recommended sustainable agricultural practices are not new and only need refinement to increase profit and protect the environment.	0.89	0.45
Sustainable agricultural systems should produce an adequate food supply to feed the world population.	1.26	0.30
An advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers.	0.62	0.60
Environmental balance is one basis for sustainable agricultural practices.	1.05	0.38

Note: Groups included 0 educational activities, 1 educational activity, 2-4 educational activities, and 5 or more educational activities.
[a]Reverse coded.

Agricultural education teachers have the opportunity to reach a wide audience through their secondary school agricultural education curricula. Imparting new agricultural practices to the next generation of agricultural producers cannot be overlooked as a viable way to serve as a change agent in agriculture. As new knowledge and practices related to sustainable agriculture are developed, agricultural education teachers can take the initiative to integrate this information into their existing curricula. There overall positive perceptions of the benefits of sustainable agricultural practices to the environment may serve as a major influence for them to promote sustainable agriculture. According to Williams and Wise (1997), agriculture teachers need to know how components of sustainable agriculture fit together to impact the environment, farm profits, and the local community. Both Williams and Wise and Whent (1997) found that secondary students were concerned about environmental safety. Teaching sustainable agricultural practices may be an appropriate response to addressing the concerns of students.

Agricultural education teachers reported relatively high levels of knowledge regarding sustainable agricultural practices. Many of the components of sustainable agriculture are not new to conventional agriculture, as single components. It is possible that teachers could have regarded each of these components of sustainable agriculture separately, and not as a total program of sustainable agricultural practices. The high perceived levels of knowledge of sustainable agriculture could have accounted for the minimal impact of educational activities related to sustainable agriculture on the perceptions ofthe teachers. Perhaps the recommendation of Gamon, Harrold, and Creswell (1994) to the extension educators is relevant with this population. They suggested that extension educators look for new delivery methods and educational approaches for reaching clientele.

The following recommendations are made based upon the results and conclusions of this study:

1. Sustainable agricultural practices differ depending upon the type of agricultural production in a specific situation. In order to implement sustainable agricultural practices into the secondary curriculum, teachers need specific information on sustainable livestock production systems and sustainable crop production systems. This information should include materials that could be infused into the existing agricultural education curriculum and could include agricultural research activities related to sustainable agricultural practices that could be conducted by students.

2. Teachers should be provided information on the economic viability of sustainable agricultural practices. In order for teachers to effectively promote sustainable agriculture programs in their local communities, they must be convinced that the practices will not have an adverse effect on agricultural profitability.

3. Agricultural programs at colleges and universities should provide information on sustainable agriculture programs in a wide variety of agricultural disciplines. Agricultural education teachers come from a variety of agricultural backgrounds, so it is important to infuse sustainable agricultural principles into a variety of agricultural disciplines in order for teachers to be exposed to this information.

4. As with all other emerging areas in the field of agriculture, teachers should be encouraged to keep up-to-date with the latest developments in sustainable agricultural practices. Teachers should be encouraged to utilize local cooperative extension professionals more than they have in the past as a source of information on sustainable agriculture. Attending workshops

and other educational activities related to sustainable agriculture should continue to provide valuable information to agricultural education teachers.

5. Future research on sustainable agriculture should focus on sustainable agricultural systems, rather than components of systems. It is important to know that teachers understand how all of the components fit together into a system of agricultural management if they are to be expected to teach sustainable agricultural management practices to their students.

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Attitudes of Arkansas Daily Newspaper Editors Toward Agriculture

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Abstract

The primary purpose of this study was to determine Arkansas daily newspaper editors' attitudes toward agriculture that might affect their decision to print, or not to print, agricultural news. Specifically, this study sought to describe the demographic characteristics of editors of Arkansas daily newspapers; determine editors' self-reported knowledge level of agriculture, experience in agriculture, and perception of the importance of agricultural issues; and to determine the attitudes of Arkansas daily newspaper editors toward agriculture. The study used a Web-delivered instrument developed by the researcher. The population of the study consisted of the primary editor of each daily newspaper in Arkansas, as identified by Burrelle's Information Services.

Of the editors responding to the questionnaire, 81% were male. The mean reported age was 44.8, with a range of 31 – 59 years. Most editors lived in a rural area, worked for newspapers that were corporately owned, had 10 or more years experience in journalism, and had considerable experience in writing agricultural news stories. Most were well educated, but had completed only a few college agriculture courses. Two-thirds of Arkansas' daily newspapers published an agricultural section, but less than one-fourth employed an agricultural reporter. For the most part, editors believed that their readers' interests coincided with their own. Health, food safety, and environmental issues were viewed as the areas of greatest interest. Editors possessed positive attitudes toward the agricultural industry, although they were less positive about the image of agriculture or about agriculture's performance in educating the public about the agricultural industry. Editors agreed that journalists should receive instruction in agriculture and that K-12 students should be required to take at least one course in agriculture.

It was recommended that university faculty in journalism and agriculture collaborate to provide a course for students and/or young journalists about agricultural issues, and be encouraged to continue positive, open relationships with journalists to ensure open lines of communication to disseminate information about agricultural issues. Workshops should be conducted for college of agriculture faculty, extension personnel, and university researchers on how to work with, and give appropriate responses to, media representatives.

Introduction/Theoretical Framework

Journalists provide much of the information the public receives about the world, including information about agriculture. Because of this, the mass media have great influence on public perception (Rogers, 1995). Denton (1996) noted that 74% of consumers in the U.S. view their local Sunday newspaper as their primary source of information. According to Rogers' *Hypodermic Needle Model* (1995), media cause direct, immediate, and powerful effects on the public by injecting information into society. This suggests that journalists who report on agricultural issues should have at least an above average knowledge of agriculture (Rogers). In support of this thesis, Cosby (1998) documented that the media has often been blamed for making science seem revolutionary rather than evolutionary, and are frequently blamed for consumer confusion.

The prominence of the news media as a primary source of information continues to influence society as a whole. A 1993 survey of adults found that 81% considered the news media to be their primary source of information regarding science topics, especially those associated with the environment and natural resources (American Opinion Research, Inc.). Since consumers of information acquire a large portion of scientific information from the mass media (Terry, 1994), it is important that agriculturalists understand editors' attitudes toward agriculture and the topics on which they report so the industry can better work with media personnel.

Attitudes often serve as a filtering device for the way we perceive information. Likewise, the attitudes of journalists also filter what is, or is not, printed. Researchers have focused on the gatekeeping practices of journalists as an explanation for filtering information by the media before dissemination to the general public (Dimmick, 1974; Gans, 1979; White, 1950). This study was conducted to assess the attitudes of editors toward agriculture and to determine their self-reported knowledge about and experience in agriculture.

Historically, the general public has expected news content in the media to be objective and responsible. These expectations are based upon assumptions that content will be reported without bias (Schudson, 1978). However, according to Johnstone, Slawski, and Bowman (1972, 1976), this expectation has not always been met. Negative news on agricultural issues could affect long-term public support and confidence in agriculture if bias is present in publishing agricultural stories. Therefore, it is important to study how decisions are made regarding the publishing of agricultural news.

The global problem addressed by this study is the influence of editors' attitudes toward agriculture on their gatekeeping role regarding agricultural issues. This study sought to determine the attitudes toward agriculture of Arkansas daily newspaper editors and to describe the demographic characteristics of these editors.

Westley and McLean (1957) provided the theoretical framework for this study. They introduced a model of communication where Lewin's (1943, 1947) gatekeeper concept was introduced. The Westley and McLean model of communication illustrated and established the gatekeeping phenomenon (Figure 1). In the model, information is gathered by a reporter (A) who then passes it on to the editor (C). In his/her role as gatekeeper, the editor makes the ultimate decision to include or exclude the information. This decision is likely influenced by several factors, including the editor's attitude toward the information, demographic influences, etc. Once published, the consumer (B) either accepts or rejects the information. They may provide feedback to the reporter (A) or the editor (C). If the information is perceived to be unbiased, the consumer likely will accept it as fact. However, since the gatekeeper controls the flow of information, if extraneous influences cause the gatekeeper to view the information negatively, it is likely the consumer will receive the information in a negative context – or not receive the information at all.

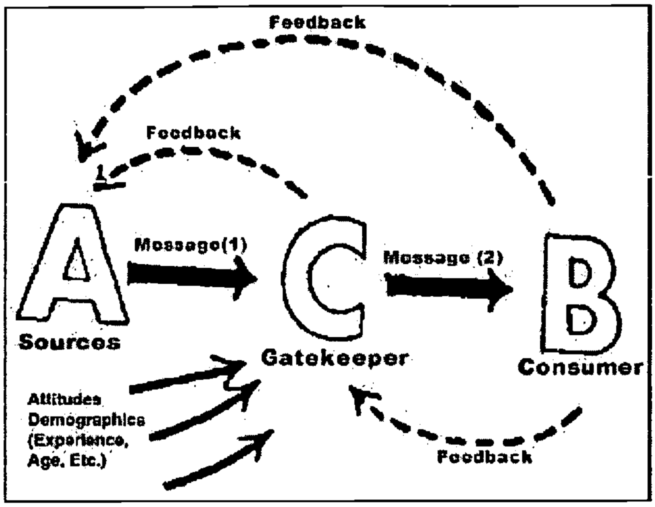

Figure 1. Westley and McLean's (1957) model, as adapted for this study.

Since agriculture affects people across the globe, it is important for editors to be as accurate as possible when publishing agricultural news. With topics such as food safety, animal health, and biotechnology dotting newscasts and newspapers around the world, the process editors go through to make decisions about the newsworthiness of agriculture issues becomes increasingly important. Because editors are reporting on these and other agricultural issues that affect consumers, it is important to begin delineating editors' attitudes toward these issues.

Purpose/Research Questions

The primary purpose of this study was to determine Arkansas daily newspaper editors' attitudes toward agriculture. Specifically, this study addressed the following research questions:

1. What were the demographic characteristics of editors of Arkansas daily newspapers?
2. What were Arkansas daily newspaper editors' self-reported knowledge level of agriculture, experience in agriculture, and perception of the importance of agricultural issues?
3. What were the attitudes of Arkansas daily newspaper editors toward agriculture?

Methods/Procedures

This research used a survey design. The census study focused on gathering information from the entire population of daily newspaper editors in Arkansas. Ary, Jacobs, and Razavieh (1979) noted that a major disadvantage of survey research is that chance differences between samples may seriously bias results. Conducting a census study mitigates the problem of chance differences.

The population for this study consisted of the primary editor of each daily newspaper in Arkansas ($\underline{N} = 30$). Burrelle's Information Services (1999) was used as the population frame.

Daily newspapers were targeted because of their perceived contribution to the knowledge gap on local and regional issues as suggested by Palmgreen (1979) and Tichenor (1987).

A questionnaire was developed by the researchers to address the stated research questions. Measurement error is one of the major sources of error in descriptive survey research. To help control for this error, instruments from similar studies were examined to aid in the construction of the questionnaire (Duhe, 1993; Dyer, 1994; Reisner & Walter, 1994; Stringer, 1999; Vestal, 1998; Whitaker, 1998; Wood-Turley, 1998). The questionnaire contained 47 statements designed to measure daily newspaper editors' attitudes toward five agricultural themes. A five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree) was used for the attitudinal items.

As suggested by Tuckman (1978), a panel of experts reviewed the instrument for content and face validity and judged to be valid. The selection of the panel of experts was based on knowledge of journalism, agriculture, and research methods. The instrument was pilot tested using daily newspaper editors from Illinois. A split-half reliability analysis on the attitudinal questions in Part I of the questionnaire resulted in a reliability coefficient of .93.

Data were collected for this study using a Web-based questionnaire as outlined by the Dillman Tailored Design Method (2000). The Dillman Tailored Design Method is a revision of the Dillman Total Design Method (1978) and adds the flexibility of using a variety of data collection procedures, especially email and Web based instruments.

The initial email included a letter of introduction explaining the purpose of the study, the link to the URL location of the questionnaire, and instructions on completing the questionnaire. The introduction page of the Web-based questionnaire provided a brief overview of the purpose and instructions for completing the questionnaire. Precautions were taken to ensure that each newspaper editor completed the questionnaire only once.

After the initial email contact was made, follow-up phone calls were made one week later. Respondents who had not replied were sent a second email message. A second phone call was placed to remind non-respondents to complete the questionnaire. A follow-up email message containing the original message was sent, if requested, at that time. Respondents were also given the option of filling out a FAX version of the questionnaire. A final follow-up phone call was placed to non-respondents four weeks after the instrument was made available online.

FAX and Web responses were compared to control for error in data collection between the two instrument formats. No differences were found between the responses of editors comparing the two data collection formats. Non-respondents were contacted a final time. Non-response error was examined by comparing selected items between respondents and non-respondents.

Though technically ordinal data, results from Likert-type scales were treated as interval data for analysis and presentation of results as outlined by Clason and Dormody (1994). A descriptive analysis using means, modes, frequencies, percentages, and standard deviations were used to analyze and interpret data. For data analysis and interpretation purposes, results generated for attitude were categorized using the following classifications: Strongly Disagree =

1 – 1.79, Disagree = 1.80 – 2.59, Undecided = 2.60 – 3.39, Agree = 3.40 – 4.19, Strongly Agree = 4.20 – 5.0.

Results/Findings

A total of 70% (n = 21) of the population completed the questionnaire. All responses were useable for data analysis.

Question 1: *What were the demographic characteristics of editors of Arkansas daily newspapers?*

Of the 21 editors responding to the questionnaire, 17 (81%) were male. The mean reported age of all respondents in this study was 44.8, with a range of 31 – 59 years of age. Nearly all respondents had earned a college degree. One respondent (5%) reported receiving a master's degree whereas seventeen (81%) had received bachelor's degrees. No degrees higher than a master's degree were reported.

Most editors worked for corporately owned newspapers. Twelve editors (57%) indicated corporate ownership of their paper, whereas eight editors (38%) worked for a family-owned newspaper. As expected, most editors resided in small to moderate communities (Figure 2).

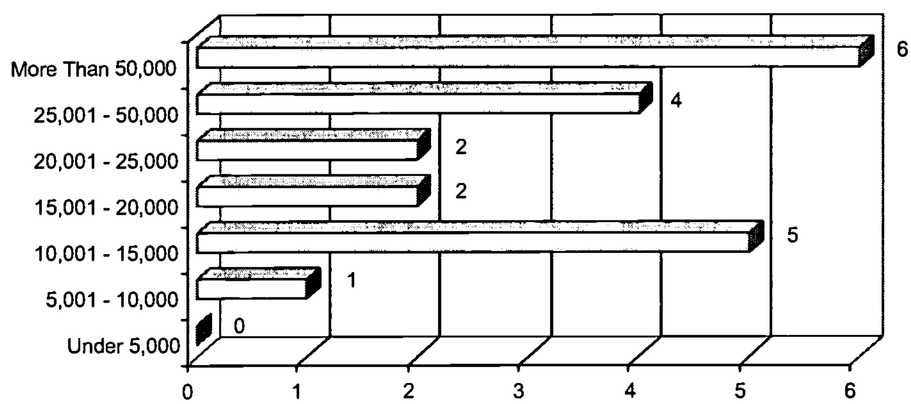

Figure 2. Size of communities where editors reside.

All categories of newspaper circulation were represented in the results (Figure 3). A majority of editors (57%) worked at newspapers with a circulation size of 5,001 - 15,000.

Editors indicated substantial experience as journalists. Seventeen editors (81%) listed 13 or more years experience as a journalist. All respondents had held more than one full-time newspaper position. A majority of respondents (n = 19) had been reporters prior to becoming an editor, indicating experience in gathering news stories and working with sources. However, some editors had never served as a reporter.

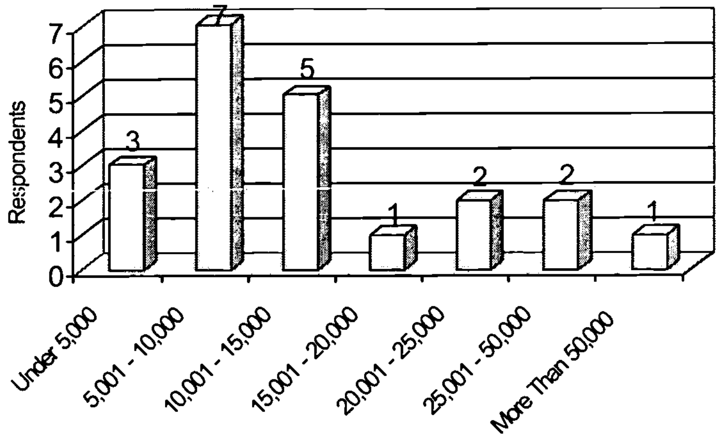

Figure 3. Circulation sizes of daily newspapers.

Question 2: *What were Arkansas daily newspaper editors' self-reported knowledge level of agriculture, experience in agriculture, and perception of the importance of agricultural issues?*

Editors' self-reported knowledge level of the agriculture, food, fiber, and natural resources industry was generally perceived to be high. Eighteen editors (86%) indicated having an "Average" to "Somewhat High" level of knowledge about agriculture, although few editors indicated that they had completed formal coursework in agriculture. More than three-fourths of the respondents (76%) had never taken a course in agriculture. Only one editor (5%) had completed 10 or more courses in agriculture.

There are a variety of ways to get experience in agriculture, just as there are various levels of experience. The majority of editors (67%) indicated they had experience in agriculture from living in a rural area. Nine editors (43%) indicated they had worked on a farm, five (24%) reported that they had completed a high school agriculture course, and five editors (24%) had completed a college agriculture course. Only three editors (14%) had attended extension workshops in agriculture. Four editors (19%) indicated no experience in agriculture.

Fourteen of the 21 editors (67%) indicated that they publish a special agriculture section or page. However, only five of the newspapers (24%) had an agricultural reporter assigned to cover agricultural news. For newspapers that did not have an agriculture section, agricultural news typically appeared in the business section.

The percentage of newspaper issues containing agricultural news in the last 12 months was consistant between newspapers. Respondents indicated a range of 6% to 40% of their daily news publications contained agricultural news.

The number of agricultural news stories printed in daily newspapers changed somewhat during the last five years. Nine of the 21 editors (43%) reported an increase in the number of agriculturally related news items. Six editors (29%) indicated the amount printed remained the same, whereas only one editor noted a decrease in agricultural news stories.

Editors were accustomed to writing agricultural news stories. During their careers, 16 editors (76%) had written more than 20 agricultural stories. Only one editor had written no stories about agriculture in their career.

Whether or not agricultural news gets published in daily newspapers may be a function of the perceived level of reader interest by the news gatekeeper. Editors were asked to give their opinion of the interest among their readers in agricultural news. While three editors (14%) indicated their readers were "Very Interested" in agricultural news, more than three-fourths of the editors (76%) indicated their readers were "Somewhat Interested." The topics in which editors perceived their readers to be most interested are listed in Table 1.

Table 1

Importance and Readers' Interest Levels of Agricultural Topic Areas (n = 21)

Importance				Reader's Interest		
M	SD	Order	Topic Areas	M	SD	Order
3.62	.50	1	Water Quality	3.38	0.50	2
3.43	.75	2	Animal Health (mad cow disease, etc.)	3.24	0.62	4
3.38	.67	3	Human Health	3.43	0.68	1
3.38	.74	3	Environment	3.05	0.74	6
3.29	.72	5	Food Safety	3.14	0.65	5
3.14	.79	6	Agricultural Economics/Farm Income	2.71	0.96	9
3.10	.77	7	Business/Consumer Information	2.81	0.75	7
3.10	.89	7	Alternative Fuels	2.00	0.86	19
3.05	.80	9	FFA, 4-H, other Ag Organizations	2.76	0.89	8
3.00	.71	10	Urban/Rural Conflict	2.67	0.86	10
2.95	.86	11	Gardening	3.38	0.67	2
2.86	.85	12	Biotechnology	2.24	0.77	16
2.81	.81	13	Food Access/Security	2.62	0.74	11
2.80	.83	14	Agricultural Legislation	2.45	1.00	13
2.76	.89	15	Farm Land Development	2.52	0.87	12
2.71	.72	16	Animal Production	2.29	0.85	15
2.71	.85	16	Genetically Modified Organisms (GMOs)	2.14	0.79	18
2.57	.60	18	Pest and Disease Control	2.43	0.68	14
2.57	.87	18	Crop Production	2.24	0.94	16
2.19	.68	20	Animal Rights Issues	1.90	0.62	20

The perceived level of importance of the topic by the gatekeeper is another factor that may influence whether a story is published. Editors indicated that their perceptions of the most important topics related to agriculture were water quality, followed by animal health, human health, environment, food safety, agricultural economics/farm income, business/consumer information, alternative fuels, FFA, 4-H, and other ag organizations, and urban/rural conflict, gardening, biotechnology, food access/security, agricultural legislation, farm land development, animal production, genetically modified organisms, pest and disease control, crop production, and animal rights issues.

Do editors perceive that readers are interested in the same agricultural issues as the editors themselves? Table 1 indicates strong similarities, with the only major differences noted in the ranking of alternative fuels and gardening. Editors ranked their interest level for alternative fuels as 7th on the list of 20 topic areas, whereas they perceived their readers' interest in alternative fuels as 19th of these 20 topics. Editors believed that the level of reader interest in gardening to be the 2nd highest area of interest, whereas editors ranked gardening as 11th.

Question 3: *What were the attitudes of Arkansas daily newspaper editors toward agriculture?*

Arkansas editors "strongly agreed" with the attitudinal statement, "Agriculture is an important industry in Arkansas" (M = 4.90). (See Table 2.) Editors also strongly agreed that "Agriculture is a scientific area" (M = 4.43), "Animals are an important source of food" (M =4.38), "Agriculture is a highly technical industry" (M = 4.38), "Agriculture has the scientific capacity to develop new technologies to improve society" (M = 4.33), "Agriculture is a vital part of my community" (M = 4.29), "Agriculture is a constantly changing industry" (M = 4.29), and that "Family farms are vital to the success of Arkansas agriculture" (M = 4.24).

Table 2

Attitudinal Statements with which Arkansas Daily Newspaper Editors Strongly Agree (n = 21)

Statement	M	SD
Agriculture is an important industry in Arkansas.	4.90	0.30
Agriculture is a scientific area.	4.43	0.60
Animals are an important source of food.	4.38	0.50
Agriculture is a highly technical industry.	4.38	0.59
Agriculture has the scientific capacity to develop new technologies to improve society.	4.33	0.48
Agriculture is a vital part of my community.	4.29	0.96
Agriculture is a constantly changing industry.	4.29	0.64
Family farms are vital to the success of Arkansas agriculture.	4.24	0.89

Note. Classifications based on the scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Undecided; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree

Arkansas editors "agreed" with several attitudinal statements that pertained to sustainable agriculture, agricultural technology, environmental issues, food safety, food supply, and food costs. (See Table 3.) Editors agreed that sustainable agricultural practices helped protect the environment, and that the use of animals for research purposes was important. Editors also agreed that agricultural technology had a positive impact on the U.S. standard of living, agriculture should do more to publicize its scientific contributions to society, American agricultural products were safe for human consumption, all journalists should receive some instruction about agricultural issues, consumers had confidence in the safety of their food, at least one course in agriculture should be required for all K-12 students, genetic research is necessary to ensure a dependable food supply, and that genetic research is necessary to ensure an abundant food supply.

Table 3

Attitudinal Statements with Which Arkansas Daily Newspaper Editors Agree ($n = 21$)

Statement	M	SD
Sustainable agricultural practices (e.g. soil conservation, integrated pest management, decreased use of fertilizers and other chemicals, etc.) help protect the environment and our natural resources.	4.19	0.51
The use of animals for research purposes is important.	4.19	0.40
Agricultural technology has a positive impact on the U.S. standard of living.	4.05	0.86
Agriculture should do more to publicize its scientific contributions to society.	4.00	0.32
American agricultural products are safe for human consumption.	3.95	0.50
Science-based technologies in agriculture have the potential to help resolve environmental concerns.	3.90	0.62
Biotechnology in agriculture provides needed products for human use.	3.86	0.48
The prices farmers receive for their products are too low.	3.81	0.87
Farmers are good stewards of the environment.	3.76	0.62
There are numerous career opportunities in agriculture.	3.76	0.83
All journalists should receive some instruction about agricultural issues.	3.71	0.64
More biological (vs. chemical) control of pests should be used in agriculture.	3.71	0.72
Consumers have confidence in the safety of their food.	3.67	0.66
At least one course in agriculture should be required for all K-12 students.	3.67	0.80
Genetic research is necessary to ensure a dependable food supply.	3.67	0.58
Genetic research is necessary to ensure an abundant food supply.	3.62	0.59
Corporate farms are vital to the success of Arkansas agriculture.	3.62	0.74
Agricultural producers use effective conservation practices.	3.57	0.60

Note. Classifications based on the scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Undecided; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree

Editors responded with means in the "undecided" range for a number of attitudinal statements that pertained to animal production and processing, the image of agriculture, and the marketing of agricultural products (See Table 4.). Statements with which editors were undecided included: "The image of agriculture is improving," "The public receives valuable agricultural information from the media," "Procedures used in the processing of animals are appropriate," "Livestock are handled in a humane manner by producers," and that "Imported agricultural products are safe for human consumption." However, standard deviations throughout these statements indicate variance in the expressed attitudes.

Editors "disagreed" with attitudinal statements that dealt with knowledge about agriculture, the stability of the agricultural economy, and agriculture's contribution to the deterioration of the environment (See Table 5.). Editors disagreed that agriculture has greatly contributed to the deterioration of the environment, the U.S. agricultural economy was stable, most journalists were knowledgeable about agricultural issues, and that the American public was knowledgeable about agricultural issues.

Table 4

Attitudinal Statements with Which Arkansas Daily Newspaper Editors Were Undecided ($n = 21$)

Statement	M	SD
The image of agriculture is improving.	3.38	0.92
The public receives valuable agricultural information from the media.	3.33	0.97
Procedures used in the processing of animals are appropriate.	3.29	0.78
Livestock are handled in a humane manner by producers.	3.24	0.77
Imported agricultural products are safe for human consumption.	3.10	0.83
Farmers use chemicals appropriately for pest management.	3.05	0.74
Farmers effectively use agricultural markets.	2.95	0.86
Livestock confinement operations maintain humane animal living conditions.	2.86	0.85
Agriculture is a major contributor to pollution.	2.86	0.85
The ag. industry does an adequate job of informing the public about ag. Issues.	2.76	0.83
The prices received by processors of agricultural products are too low.	2.76	0.70
The agricultural industry does an adequate job of public relations.	2.67	0.80
Agriculture has a negative image.	2.62	1.02

Note. Classifications based on the scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Undecided; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree

Table 5

Attitudinal Statements with Which Arkansas Daily Newspaper Editors Disagree ($n = 21$)

Statements	M	SD
Agriculture has greatly contributed to the deterioration of the environment.	2.57	0.75
The U.S. agricultural economy is stable.	2.29	0.78
Most journalists are knowledgeable about agricultural issues.	2.05	0.67
The American public is knowledgeable about agricultural issues.	1.90	0.54

Note. Classifications based on the scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Undecided; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree

Conclusions /Implications/Recommendations

Most Arkansas daily newspaper editors live in a rural area, work for newspapers that are corporately owned, have 10 or more years experience in journalism, and have considerable experience in writing agricultural news stories. Most are well educated (though not in agricultural subject matter), have completed few college agriculture courses, and have attended very few Extension workshops.

Two-thirds of Arkansas' daily newspapers print an agricultural section, but less than one-fourth employ an agricultural reporter. This necessitates that journalists who also have other duties and assignments write agricultural news stories as well.

For the most part, editors believe that their readers' interests coincide with their own. Health, food safety, and environmental issues were the areas of greatest interest. Interestingly, biotechnology and genetic modification of organisms ranked toward the bottom of editors' list of interests.

Editors possess positive attitudes toward the agricultural industry, although they were less positive about the image of agriculture or performance in educating the public about the agricultural industry. Editors expressed attitudes that were positive about such topics as the technical and scientific nature of agriculture, the ability of agriculturalists to address issues dealing with environment and research, and the belief that agriculture provides a safe and abundant food supply. With positive attitudes in these areas, it is likely editors would be biased toward reporting positive news about these topics – if bias in reporting occurs, as indicated by Hayakawa and Hayakawa (1990).

Editors agree that more education in agriculture is necessary. Editors expressed attitudes in agreement that journalists should receive some instruction in agricultural issues and that K-12 students should be required to take at least one course in agriculture.

While editors and journalists should be encouraged to garner more information about agricultural issues, the responsibility for informing editors and other journalists rests primarily with agriculturalists themselves. Journalists need to be able to draw upon a diverse knowledge base, but it may be up to agricultural educators/communicators to provide that knowledge. It is not realistic to expect journalists to receive educational training in all areas in which they will be reporting throughout their careers. However, by working together to ensure that journalists/editors fully understand agricultural issues, less bias in reporting agricultural news should be an expected outcome.

Another strategy to address the possible lack of literacy in the understanding of agricultural issues is for university faculty in journalism and agriculture to collaborate to provide a course for students and/or young journalists about agricultural issues. University faculty should also be encouraged to continue positive, open relationships with journalists to ensure open lines of communication in order to disseminate information about agricultural issues. Workshops should be conducted by agricultural communication and agricultural education faculty for other college of agriculture faculty, extension personnel, and university researchers on how to work with, and give appropriate responses to, the media.

A qualitative study should be conducted that delineates how attitudes and experience impact the decision-making process of journalists. Likewise, additional studies should be undertaken to determine the influence of editors' and other journalists' attitudes on weekly newspaper and news magazines gatekeeping strategies. Research should also be conducted to determine the effectiveness of the use of technology (i.e., listserves, bulletin boards, World Wide Web sites, etc.) in providing updated information to journalists about agriculture. This could allow agricultural educators and communicators to target editors with updated information in the most effective manner.

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North Carolina Home School Providers' Perceptions Of Agricultural Education

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Abstract

The purpose of this study was to determine (a) the level of interest of home school providers towards agricultural education, including Supervised Agricultural Experience programs and FFA, (b) what potential resources would be needed for instruction, and (c) whether interest of home school providers toward agricultural courses was based upon the home school being located in a rural, suburban, or urban location.

Data were collected by using a mailed questionnaire sent to 500 home education providers in nine counties throughout North Carolina. The counties were selected based upon classification as a rural, suburban, or urban county. Data were analyzed utilizing descriptive statistics. It was concluded that home school providers were interested in agricultural courses, such as horticulture, and would be interested in teaching resources such as a textbook. Home education providers were somewhat less interested in FFA membership and participation. This study also found that supervised agricultural experience programs were of interest to most home school providers. There was no difference among home school providers in rural, suburban, and urban locations in interest level in of providing agricultural courses for their students.

Introduction/Theoretical Framework

Should all students be given the opportunity to learn about the food, fiber and natural resource systems? If the answer is yes, the question that remains is whether non-public school educated students should be provided opportunities to enroll in agricultural courses, have active membership in the National FFA Organization, and participate in supervised agricultural experience programs.

It is estimated that there are 1.5 million children home schooled across the country (Kantrowitz and Wingert, 1999). According to Orsi (1998), home schools are one of the fastest growing segments within education. With a growth rate of nearly 15% per year, home education will need new educational opportunities for students (Orsi, 1998). Lines (1999) noted that, according to the United States Department of Education, home education has seen tremendous growth during the past decade and is not expected to slow.

Reasons why parents choose home schools for their children are various, depending upon the family and student needs. Rust and Reed (1980) believed that home school parents were dissatisfied with state-controlled schools. However, according to Koetzsch (1997), the most common reason that families choose home education was for religious-based instruction. Linden (1983) found that home education was important for families who wished to shield their children from negative influences of the public schools. Williams (1984) found that parents choose home education because of unsuitability of the child for school, desire to control the learning process, socialization, control of the content taught, and personal interest. Headley (1998) stated that home education was advantageous for families because it permitted parents to establish and control curriculum, the educational process and values that their children would be exposed to while attending school. With the increase of school violence within the public education system, more parents view home education is a safe alternative to the public schools (Koetzech, 1997).

Unlike the public school system, there is no universal curriculum used by home school providers. According to Ray (1997), over 70% of home school parents customize the curriculum for their children. This allows the parents to adjust the curriculum to best suit the child's interest or family lifestyle. Schemmer (1985) found great variety in the curriculum used, and that most home school providers used curriculum produced by commercial publishers. Mattingly's (1990) study of home schools in Kentucky and Indiana concluded that most curriculum used by home schools was commercially-prepared, self-paced programs. Mattingly concluded that home school providers purchase instructional material at home-schooling training seminars and teacher supply retailers and extensively relied on textbooks from public school suppliers.

With the increasing role of online technologies, many home school providers have begun to use online courses for complete or supplementary instruction (Zehr, 1999). Home educators have also begun to look at the public school system in providing services to their students. In Idaho, a system of dual-enrollment allows students from home and private schools to have access to public schools for a portion of the day (Diegmueller, 1995). Holt (1983) believed that home schools and public schools should cooperate and provide opportunities for home schools students to come for partial days, use public school facilities, and attend specialty course such as band and home economics.

Frick and Brennan (1998) noted that home educators could benefit from instructional materials and learning activities offered through agricultural education courses. Agricultural education materials could be combined with "hands-on" learning opportunities and supervised agricultural experience programs to provide work-based learning opportunities, and FFA activities would provide home education with activities that link classroom instruction and the application of skills (Frick and Brennan 1998).

A variety of courses in North Carolina are listed among the Agricultural Education Course descriptions that could be suitable for students who are home educated. The potential courses are as follows: (1) Agricultural Production and Management, (2) Agriscience Applications, (3) Animal Science, (4) Environmental and Natural Resources Studies, (5) Exploring Biotechnology, and (6) Horticulture.

The integration of classroom instruction, supervised agricultural experience programs and FFA membership within home education is a relatively new inquiry in the agricultural education profession. Because of the brevity of research conducted within home education, the "knowledge gap" of a potential relationship of agricultural education and home education is quite profound. Archer (1999) suggested that although home education continues to grow, many researchers have avoided the topic. Sampling problems, risk of being labeled an advocate or opponent, and lack of funding are reasons that home education still remains, in many regards, a mystery to many educational researchers (Archer, 1999).

Home education providers try to encourage their children to participate in leadership and social development activities ranging from religious based organizations to Scouts. Wingenbach and Kahler (1997) addressed the issue of perceived advanced youth leadership and life skills in their study. From their investigations, they found that leadership and life skills development were defined as skills in communications, decision making, interpersonal relationships, learning, resource management, understanding self, and working with groups (Wingenbach and Kahler, 1997). These concepts were deemed as important qualities that were derived from FFA leadership and personal development activities. Dormody and Seevers (1994) believed that students should join FFA and participate in leadership activities regardless of self-esteem, age, ethnicity or place of residence. Scanlon, Yoder, Hoover and Johnson (1989) examined the factors that impacted a student's decision to join FFA. Students listed the development of leadership and communication skills as the most common reasons for joining FFA.

The purpose of the SAE program, in conjunction with classroom instruction and FFA activities, is to develop skills, concepts and values needed to work in the agricultural industry (Rawls, 1982). Rawls found that parents perceive the benefits from SAE's were the positive development of work attitudes, occupational development, and human relation skills. Pals (1988) examined the value of supervised experience programs as perceived by students of agricultural education programs and found that students believed they benefited from SAE by, developing responsibility, developing interest in agriculture, learning to keep records, and making class subjects and content practical.

Purpose

The purpose of this study is to determine if home school providers are interested in providing agricultural education, FFA membership and supervised agricultural experience programs participation to home educated students. The following research questions were addressed:

1. What is the interest level of home school educators towards agricultural related course subjects, and what potential resources would be needed for instruction?
2. What is the interest of home school educators in student participation in a Supervised Agricultural Experience program, and what potential resources would be needed?
3. What is the interest of home school educators in National FFA Organization membership and participation for their students?
4. Are the interests of home school educators in providing the agricultural courses different, based upon the school being located within a rural, suburban, or urban environment?

Methods/Procedures

The research methodology used in this study is an example of descriptive research. Gall, Borg & Gall (1996) describe this type of inquiry as, "a type of research that measures the characteristics of a sample or population on pre-specified variables." Through survey research methods, home school providers in nine counties throughout North Carolina were contacted. Because so little is known about the extent of home schooling in secondary school aged children in North Carolina, this study was undertaken as an exploratory study.

The population consisted of home school providers throughout North Carolina teaching students between the ages of 13-18. The population of home school providers is unknown however, it is estimated that 4,000 to 5,000 students between ages 13-18 are currently being educated at home. The sample consisted of home school providers in western, central and eastern North Carolina counties in order to represent the geographic diversity of the state. The sample was also chosen to incorporate home school providers within rural, urban and suburban counties. Proportional sampling was used for determining the sample size of home school providers within nine counties throughout the state. The sample size was 500 home school providers. According to sampling formulas provided by Cochran (1977), this should provide an adequate sample size for an unknown population. The sample was selected from a rural, suburban, and urban county in the western, central, and eastern part of the state.

A questionnaire was developed by the researcher to identify the interest of home school providers in offering agricultural education and the resources needed for instruction and full participation in the agricultural education program. Content validity was assessed by a panel consisting of agricultural education faculty at North Carolina State University, the State Agricultural Education Coordinator, and the State FFA Coordinator. Reliability of the scaled items was assessed from data obtained in a pilot test of the instrument. The coefficient of internal consistency was $\alpha = .74$. The first section of the questionnaire addressed the age level of the home school student and population demographics of the location of the school. If home school providers indicated that the school taught students in the age level of 13 – 14, or age level of 15 or higher, all sections of the questionnaire were relevant to the inquiry. If the respondent did not teach a child at least 13 years of age, they were instructed not to complete the questionnaire and simply return it to the researcher.

The next section evaluated the interests of home school providers towards agricultural education. Respondents were asked if adequate resources and materials were available to home school providers, would they teach agricultural courses in their home school. Participants indicated interest by responding "yes", "no" or "perhaps." After the completion of this portion of the questionnaire, those respondents who indicated "no" were instructed to complete a section of the instrument that served to identify reasons that they were not interested in teaching agricultural courses. If the participants indicated an interest in teaching agricultural courses or indicated "perhaps" interested, those parents, using a Likert-scale, identified agricultural content areas they would be interested in teaching. Content areas included agriscience, agricultural production and management, animal science, biotechnology, environmental and natural resources, and horticulture. Using a Likert-type scale, home school providers addressed the types of resources needed to successfully teach agriculture.

Respondents also were also asked to indicate their interest in providing FFA membership to their students by choosing, "yes", "no", or "perhaps." Participants who indicated "yes" or "perhaps" evaluated various FFA activities, career development events, and personal development opportunities.

Interest in supervised agricultural experience programs and those resources needed for home school educators to effectively provide a SAE program was evaluated in the next section. Respondents were asked to indicate their interest in providing supervised agricultural experience programs to their students. Response choices were, again, "yes", "no", or "perhaps." Using the scale of 0-3, home school providers indicated their interest in providing SAE programs for their students. Items included in this section described the major SAE areas. The final section of the questionnaire asked providers to evaluate the resources that would be needed to effectively incorporate supervised agricultural experience programs within the home school.

A total of 187 responses were received after two mailings of the questionnaire to the target population. This represented a response rate of 37.4%. While this response rate is relatively low, it is considered very acceptable for market research to a general population. To control for potential nonresponse error, data from early and late respondents were compared (Miller and Smith, 1983). No significant differences were found between early and late respondents for the major variables in the study.

Descriptive statistics including frequencies and percentages were used to assess the interest of home school providers in offering agricultural education, National FFA Organization activities, and supervised agricultural experience opportunities. In order to determine difference levels of interest of home school providers based upon location (rural, urban, suburban), analyses of variance techniques were used with a Fisher's LSD post hoc test.

Results

In determining the interest levels of home school providers toward agricultural education, the study first addressed the age level of the children being taught at the home school. Home school providers indicated the age of their students in one of three categories. The categories were: ages 5-12, ages 13-14, or ages 15 and older. Slightly over half (51%) of all respondents indicated they were teaching students in the age demographic eligible for secondary agricultural education in the public school system.

When asked to evaluate interest of teaching agricultural courses, "yes", "no," and "perhaps,"" statements were used. While 23% of respondents indicated "no," they were not interested in teaching agricultural courses, 77% of respondents indicated some level of interest in teaching agricultural courses. Those respondents who indicated "no" to the question of interest in teaching agriculture were asked to complete a section which contained items to evaluate why agricultural courses would not be of interest. Nearly 78% of those respondents who responded "no" indicated that their student had no interest in agriculture. Over 60% of the respondents selected the statement that they did not have the skills or knowledge to teach agriculture.

Assessing the types of courses that home school providers would offer was also evaluated using the following Likert-scale: 0 = no opinion, 1 = disinterested, 2 = perhaps interested, 3 = highly interested. As shown in Table 1, home school providers reported the most interest in the horticulture course (M = 2.75). Almost 75% of the respondents who were interested in agriculture courses indicated a high interest in horticulture courses. Mean scores also indicated that animal science (M = 2.52) and environmental and natural resources studies (M =2.50) were also appealing to home educators (see Table 1). Over half of the respondents reported a high interest in offering these agriculture courses to home school students.

Table 1

Interest Levels of Home School Providers Towards Agricultural Courses

Agricultural Course	M	SD
Horticulture	2.75	0.42
Animal Science	2.52	0.59
Environmental and Natural Resources	2.50	0.63
Agricultural Production & Management	2.38	0.58
Biotechnology	2.31	0.74
Agriscience Applications	2.16	0.61

Note. 0 = no opinion; 1= disinterested; 2= perhaps interested; 3= highly interested

Home school educators were asked to identify resources that would be beneficial in teaching agriculture. Data are presented in Table 2. Again using a 0 – 3 Likert scale, school providers indicated that a textbook and student workbook would be useful for home schools (M = 2.7). Nearly seventy-three percent of respondents indicated that a textbook and student workbook would be "very important or needed in teaching agriculture." Also listed as important by over 60% of the respondents were the availability of a resource person in agricultural education and the use of laboratory facilities and/or greenhouses. Only 35% of the respondents felt on-line courses in agriculture were important resources needed to provide agricultural education to home school students.

Table 2

Possible Teaching Resources in Agricultural Education by Home School Providers

Teaching Resource	M	SD
Textbook and student workbook	2.70	0.52
Resource person in agricultural education	2.60	0.52
Use of laboratory facilities and greenhouses	2.59	0.52
Resources from NCSU and NC A&T	2.52	0.60
Instructional packets including videos	2.40	0.64
CD-Rom with learning activities	2.30	0.70
Training on how to teach agriculture	2.31	0.60
On-line agricultural course	2.26	0.62
Course blueprints	2.23	0.74
Test banks for each subject	2.11	0.84

Note. 1 = would not be important or needed to teach agriculture; 2 = would be of somewhat importance or somewhat needed; 3 = would be very important or needed.

An evaluation of interest in FFA membership and participation was also studied. Participants were asked, "Would your home school student(s) be interested in FFA membership and participating in FFA activities and events?" Respondents were given the following choices: "yes," "no," or "perhaps." A majority of respondents (60.3%) indicated "perhaps." There were 27.4% who indicated "yes," the student(s) at their home school would be interested in the National FFA Organization, and 12.3% did not believe that their student(s) would be interested in FFA activities.

Those respondents who indicated "yes" or "perhaps" were asked to evaluate FFA activities again using the 0-3 scale (Table 3). Horticulture or plant science contest was identified using mean scores (M = 2.12) as one FFA activity that may be of interest to home school students. This is consistent with the interest in offering horticulture courses. While only 30% of the respondents reported they were "very interested" in plant science and horticulture contests, another 39% expressed some interest in these activities. Home school providers did not express high levels of interest in FFA leadership activities such as attending FFA conventions (6.8%), parliamentary procedure contests (3.7%), or having their student serve as an FFA officer (2.7%).

Table 3

Interest in FFA Activities by Home School Providers

FFA Activities	M	SD
Plant science/horticulture contests	2.12	0.74
Livestock judging contest	1.89	0.79
Summer recreational camp	1.89	0.71
Agriscience fairs	1.88	0.73
International travel	1.83	0.84
Public Speaking contest	1.80	0.82
Student leadership conferences	1.71	0.75
National FFA Convention	1.57	0.64
Parliamentary procedure contests	1.42	0.69
Serving as a FFA officer	1.32	0.57

Note. 0 = need more information about this activity; 1 = not interested in this FFA activity; 2 = perhaps interested in this FFA activity; 3 = very interested in this FFA activity

The third component of this study addressed the interest level of home school providers towards supervised agricultural experience programs. Participants were asked if their student would be interested in the SAE program and respondent with "yes." "no," and "perhaps," statements. Of the respondents, 49.3% indicated "yes" they were interested in supervised agricultural experience. An additional 47% indicated they were perhaps interested and 4% did not express interest in SAE's.

Respondents evaluated six major types of SAE programs using the 0 –3 scale (see Table 4). Mean scores indicated that supervised agricultural experience placement programs were most appealing (M = 2.41). Nearly 50% of respondents indicated that placement programs were the types of SAE's that were of most interest. In addition, 44.4% indicated high levels of interest in providing experimental SAE programs for their students. Only 17.6% of the respondents were interested in entrepreneurial (ownership) SAE programs.

Table 4

Means and Standard Deviations of Items for the Evaluation of Interest in Supervised Agricultural Experience Programs

Type of SAE Program	M	SD
Placement programs	2.41	0.67
Agricultural experiments	2.37	0.66
Job shadowing	2.28	0.66
Analytical programs	2.27	0.63
Home/community improvement	2.02	0.70
Entrepreneurial programs	2.01	0.65

Note. 0 = need more information about this SAE activity; 1 = not interested in this SAE activity; 2 = perhaps interested in this SAE activity; 3 = very interested

Home school providers also indicated the type of resources they believed would be useful for the inclusion of SAE in the home school (see Table 5). Mean scores indicate that a resource person in agricultural education, used to answer questions about supervised agricultural experience programs, would be the most useful (M = 2.72). Over 68% of home school educators indicated the importance of having a resource person for SAE implementation. Workshops were also seen as very useful by 53.4% of the respondents, followed by on-line SAE resources (46.8%) and information on recognition programs in FFA (45.2%).

Table 5

Mean Scores and Standard Deviations for Items Evaluating SAE Resources

Item	M	SD
Resource person	2.72	0.49
Training workshop and conferences	2.51	0.61
On-line resources	2.45	0.64
Information on job shadowing	2.40	0.66
Information on FFA recognition	2.38	0.70
Entrepreneurial activities and rules	2.35	0.70
Information on record keeping	2.29	0.65
Information on SAE's student benefits	2.25	0.73
Proficiency award workbooks	2.22	0.76
Agricultural placement rules and regulations	2.17	0.68

Note. 0 = not interested in SAE; 1 = not useful; 2 = somewhat useful; 3 = very useful

Does the interest of home school providers toward offering agricultural education depend upon the location of the home school? The final research question addresses this issue. Home schools where identified as being located in a rural, suburban or urban area. Of the respondents, 40% where located in a rural area, 37% where located in a suburban area, and 23% in an urban area of the state.

To evaluate if a difference of interest was present based upon yes/no/perhaps response among respondents in rural, suburban, and urban home schools, a Kruskal-Wallis test was performed. The results indicated the following: Chi-square = 4.832, degrees of freedom = 2, and p = 0.089. The results indicated no significant difference of interest level among respondents, regardless of the home school being located in a rural, suburban, or urban environment.

An evaluation of standard deviations and mean were also used to identify differences in responses among home school providers in rural, suburban, and urban areas. This evaluation identified that the strongest reason that respondents did not want to teach agriculture is because of lack of student interest.

To determine if the interest level of home school providers is different depending upon location of the home school, mean scores and standard deviation of items describing agricultural courses were evaluated. Urban home school providers were most interested in horticulture courses ($\underline{M}$ = 2.73), followed by biotechnology courses ($\underline{M}$ = 2.69). Suburban home school providers were also most interested in providing horticulture courses ($\underline{M}$ = 2.62), followed by animal science ($\underline{M}$ = 2.56) and environmental science/natural resources ($\underline{M}$ = 2.54). Home school providers in rural areas were also most interested in horticulture courses ($\underline{M}$ = 2.80), followed by animal science ($\underline{M}$ = 2.56) and agricultural production ($\underline{M}$ = 2.50).

Analysis of variance was conducted to identify differences among respondents in rural, suburban, and urban environments. No difference was identified except in the biotechnology course. Urban respondents had a significantly higher interest in the biotechnology course than their rural or suburban counterparts (F = 3.74, df =69, p = .03).

Conclusions/Recommendations

Due to the relatively low response rate, caution should be used when generalizing the results of this study. While the researchers attempted to control for nonresponse error, the results of this study should not be generalized beyond the respondents.

Home school educators in this study are interested in providing agricultural courses to students, but their interest level varies depending upon the agriculture course. Horticulture was found to be the course that seemed most appealing to home school providers. Textbooks were viewed as the most needed resource for teaching agriculture. The agricultural education profession should begin to inform home school providers about agricultural curriculum that can be used by home school students. Curriculum packages should be created that contains student textbooks, workbooks, teacher guides and other resources needed to teach specific agricultural courses.

Supervised agricultural experience programs are of interest to a majority of home school educators in this study. Home school providers indicate that a resource person in the agricultural education profession available to questions would be the most beneficial resource. The agricultural education profession should begin identify ways that home school providers could incorporate supervised agricultural experience programs in their school. Also, the agricultural education profession should develop training seminars and literature for home school providers.

Table 6

Mean Scores and Standard Deviations for Agricultural Courses Among Rural, Suburban, and Urban Respondents

Item	Location	N	M	SD
Agriscience	Rural	30	2.13	0.63
	Suburban	21	2.04	0.59
	Urban	14	2.15	0.50
Ag. Production and Management	Rural	31	2.50	0.68
	Suburban	21	2.30	0.46
	Urban	15	2.40	0.46
Animal Science	Rural	32	2.56	0.50
	Suburban	23	2.56	0.59
	Urban	16	2.44	0.73
Biotechnology	Rural	31	2.10	0.75
	Suburban	23	2.50	0.76
	Urban	16	2.69	0.73
Environmental Science & Natural Resources	Rural	32	2.43	0.67
	Suburban	24	2.54	0.66
	Urban	16	2.50	0.63
Horticulture	Rural	32	2.80	0.42
	Suburban	16	2.62	0.50
	Urban	16	2.73	0.40

Note. 0 = no opinion; 1 = disinterested; 2 = perhaps interested; 3 = highly interested

The home school providers in this study were interested in only some of the activities offered by FFA. Home school providers indicated an interest in horticultural/plant science career development events, but not in leadership activities. A majority of home school providers need more information about FFA membership and activities. The FFA organization should look at marketing itself as an organization available for home educated students. FFA should also look how to include these students within its membership and allowing for involvement in events and activities.

The interest level of home school providers towards teaching agriculture is not influenced by the home school being located in a rural, suburban, or urban environment. However, home school students should be studied to determine their interest level in agricultural courses, FFA membership and supervised agricultural experience in rural, suburban, and urban home schools.

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Perceptions and Perceived Knowledge Levels of Texas Public School Superintendents Regarding the Agricultural Science and Technology Program

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ABSTRACT

The superintendent is a public school district's highest academic officer. The success of an agricultural science and technology program can be dependent on whether the superintendent recognizes the program as a vital part of the school and society. Therefore, the primary purpose of this study was to determine the perceptions and perceived knowledge levels of Texas public school superintendents regarding the agricultural science and technology program.

The statement of the problem was that the agricultural science and technology program in Texas is not fulfilling its maximum potential in its efforts to provide a high quality education for the student population it serves. Recognition by the program and its teachers of those areas in which improvements can be made is necessary to achieve this maximum potential and enable the superintendent to realize the program's value and its objectives.

The design for the study was descriptive, using a mailed questionnaire to gather data. The population for the study was Texas public school district superintendents in whose district an agricultural science program was offered during the 1999-2000 school year. One hundred superintendents were randomly sampled. The sample was proportional and stratified according to the ten geographic areas of the Texas FFA Association. A 71% response rate was attained.

Ninety percent of the respondents were male, the majority (55.7%) were 50 to 59 years old, and 91.4% were Anglo. Two-thirds (66.7%) indicated academics as their primary teaching area, and a vast majority had no career and technology education (82.9%) or agriscience (88.6%) teaching experience. Most (58.6%) had not been enrolled in agriscience themselves, almost two-thirds (65.7%) had not had a child enrolled, and 67.1% had work experience in agriculture.

As a group, superintendents were found to have a positive perception of the agriscience program and its teachers. Generally, they perceived the program to be a wise investment of fiscal resources and that agriscience is beneficial to students of various academic abilities. They also considered teachers to have a professional and positive image among those involved in education, and perceived teachers to be successful in meeting various students' needs. Superintendents perceived themselves to be very knowledgeable about most aspects of the program, with knowledge levels higher for areas related to funding and lower in areas related to the curriculum. Finally, they most often cited areas related to curriculum and academics as changes needed in order to remain a part of the Texas public school system in the future.

Introduction/Theoretical Framework

In 1988, the National Research Council stated that "Agriculture is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies." (p. 8). The National Council for Agricultural Education (1999) envisions agricultural education as a world where all people value and understand the vital role of agriculture, food, fiber and natural resources systems in advancing personal and global well-being. Lee and Thomas (1995) wrote that "relevant agricultural education is in the best interest of the people individually and of the United States as a collection of people." (p. 11). Reports by entities such as the National Research Council (1988) and The National Council for Agricultural Education (1999) have examined the challenges facing agricultural education and the new directions that need to be taken.

Almost since their inception, agricultural science and other vocational programs have been a part of the comprehensive high school system throughout the nation (Martin and Peterson, 1991). Furthermore, the secondary agricultural curriculum has been oriented towards production agriculture (King, 1991). Martin and Peterson (1991) stated that production agriculture still dominates most agricultural education programs, even though it no longer represents a major proportion of the jobs in the agricultural industry.

The rapidly changing demographics of the United States from a rural to an urban society have created challenges for agricultural education. Public schools' desire to prepare students for succeeding in an urban society has created a focus on a more rigorous academic program, one that readies students to continue their education at an institution of higher learning (K. Edney, personal communication, April, 1995). These factors have subsequently led administrators, board members, teachers and communities to view today's agricultural education in the same way that vocational agriculture was previously viewed - as a system with a duty to prepare students for immediate entry into farming and agriculturally-related occupations (Viterna, 1971). Students considered to have higher academic skills are often discouraged from enrollment in career-oriented programs for courses perceived to be more challenging. As a result, students and parents have developed negative stereotyped attitudes regarding programs such as agricultural education (Dyer & Osborne, 1997). Additional graduation requirements of the Texas Education Agency (1999a), such as those outlined in the Recommended High School Program (§74.12) and the Distinguished Achievement Program (§74.13), mandate that students complete a more advanced program of study, thereby limiting the number of elective and optional courses while requiring additional credits in areas such as fine arts and other languages. Schools are also giving more attention to the portions of the Academic Excellence Indicator System (AEIS) that reward them for having a high percentage of students on the two "advanced" graduation plans.

The superintendent is first and foremost the chief academic officer (Spillane & Regnier, 1998). He/she is responsible for empowering principals, who them empower her/his own staff to provide the instructional program, in addition to ensuring that established goals for the campus are met (Konnert & Augunstein, 1995). Superintendents must help identify the portions of an ideal agricultural science program necessary to help students meet the needs and demands of a global economy and workforce (B. Shaw, personal communication, January 28, 2000).

The influence of an administrator was found in a study of Kansas school districts that did not have agricultural education programs. The study concluded that administrators did not want the program in spite of the support by rural residents and agribusiness representatives (Parmley, 1982). A United Stated Department of Education (1979) national study also found a significant number of administrators did not support programs providing job skills through vocational programs, and these same administrators will determine whether or not vocational education is available in secondary schools. Counselors were found to often encourage the conventional academic route over the vocational route (Lewis & Kaltreider, 1976). Jackson and Herring (1998) concluded that high school counselors in Texas had only a slightly positive perception of the agriscience program.

There have been studies that found support for agricultural programs. Eighty percent of superintendents and principals in Nebraska indicated they favor a vocational agriculture program (Viterna, 1971). Principals in Indiana indicated they support the vocational agriculture program, but the teachers did not feel the principals took as much interest as they indicated (Martin, 1986). Administrators in Indiana also believed that vocational education should be a part of the education of all pupils (Nasstrom & Baker, 1979). A Texas study regarding communication between agriscience teachers and school administrators found the administrators to have a high regard for the program (Hinkson, 1999).

Purpose/Objectives

There has not been a major study in Texas to ascertain the perceptions and perceived knowledge levels of Texas public school superintendents regarding the agricultural science and technology program. Superintendents were selected for this study because they are the primary educational leader in cities and communities, and will thus have the most significant impact regarding the educational plans for schools.

Superintendents must recognize the agricultural science program as a vital part of the school, community, and society if the program is to be successful. In this regards, it is vital that superintendents recognize the role of the agriscience program in the public schools of Texas. Equally pertinent is the need for educators in the agricultural science program to realize opportunities to improve. Thus, the primary purpose of this study was to determine the perceptions and perceived knowledge levels of Texas public school superintendents regarding the agricultural science and technology program.

As a means of accomplishing the purpose of the study, the study focused on determining the following objectives:

1. Demographic characteristics of superintendents of Texas' public school districts;
2. Perceptions of public school superintendents in Texas toward the agricultural science program, its purpose, and its role in the total school program and the school's goals;
3. Areas of change needed by agricultural science programs, as perceived by Texas public school superintendents;
4. Quality, performance, and/or success of agricultural science teachers, as perceived by Texas public school superintendents, in regard to:

a. professionalism and image;
b. instructional abilities as it relates to preparing students for gainful employment and/or higher education;
c. knowledge of agriculture; and
d. involvement in the total school program;

5. Perceived level of knowledge possessed by Texas public school superintendents regarding the agricultural science program;

6. Future direction needed for the agricultural science and technology program, as perceived by superintendents of Texas' public school districts.

Methods/Procedures

The targeted population sample (superintendents of public school districts in Texas) was derived from districts whose high schools include agricultural science as part of the instructional program. In the 1999-2000 school year, there were approximately 880 school districts in Texas with high schools that offered agricultural science courses at the middle and high school level (Instructional Materials Service, 1999). The number of superintendents surveyed was determined according to the formula developed by Cochran (1977). The superintendent of those districts was determined by utilizing the 1999-2000 Texas Public School Directory (Texas Education Agency, 1999b) and personal communication. One hundred superintendents were included in the sample and 71 responded, resulting in a 71% response rate.

To further ensure the external validity of the survey, schools were selected within the ten geographically-arranged "areas" of the Texas FFA Association by stratified random selection. Some areas are comprised of as few as 75 agriscience departments while others have in excess of 95. Within each area, the desired number of schools was chosen using random selection.

Questions for the questionnaire were derived from a variety of previous studies that determined similar attitudes, perceptions, relationships, opinions, and practices of administrators regarding the agricultural science program and its teachers. These previous studies were conducted in Georgia (Woodard & Herren, 1995), Illinois (Dyer & Osborne, 1997), Mississippi (Johnson & Newman, 1993), Nebraska (Foster, Bell, & Erskine, 1995; Viterna, 1971), North Carolina (Jewell, 1995; Price, 1990), Oregon (Bender, 1996; Thompson, 1998), and Texas (Jackson & Herring, 1998). Additional questions were created by the researcher and Texas Tech University Department of Agricultural Education and Communications faculty members to address specific attitudes and perceptions that had not been previously studied. The instrument was mailed via first-class mail. Guidelines of Dillman's (1978) Total Design Method (TDM) were followed to increase response rates. The desired rate of response was 100%, with a 70% response rate considered the minimum acceptable level. Follow-up procedures continued until this minimum acceptable response rate was achieved or exceeded.

The instrument was a five-part mailed questionnaire. Part One contained questions pertaining to the demographic information of the subjects. Part Two consisted of questions pertaining to the superintendents' perceptions of the purpose, need, functions, and value of the agricultural science program, in which an eight-point Likert-type scale was used to record levels of agreement with statements. Part Three contained questions related to superintendents' perceptions of the ideal characteristics of an agricultural science teacher, their role in the agriscience and total school programs, their expectations regarding professionalism and professional development, and instructional abilities. The same eight-point Likert-type scale was used to indicate levels of agreement with statements. Part Four contained statements related to the agriscience program, to which superintendents indicated their perceived level of knowledge or awareness. To allow for a more elaborate response, Part Five consisted of short response questions that allowed superintendents to address specific areas not previously identified.

The instrument was evaluated to determine the validity of its content by several entities prior to distribution. Evaluators included faculty and graduate students in the Agricultural Education and Communications Department at Texas Tech University, high school agricultural science teachers, and public school administrators. Field review of the instrument was also conducted by pilot testing the survey at approximately 30 schools throughout the state, and such schools included those not randomly selected for the actual study.

Data were coded, tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) for the Macintosh computer. Descriptive statistics were reported using demographic characteristics and responses of participants.

For purposes of discussion, means for agreement or knowledge are reported using the following interpretations: a mean of 7.6 or above denotes the highest level or complete; a mean between 7.5 and 6.6 indicates a very high level; a mean between 6.5 and 5.6 signifies a moderately high level; all means within the range of 5.5 to 4.6 indicate a reasonably high level; a mean within the 4.5 to 3.6 range denotes a reasonably low level; a mean between 3.5 and 2.6 indicates a moderately low level; any mean between 2.5 and 1.6 signifies a very low level; and a mean of 1.5 or below indicates the lowest level or none.

Results/Findings

Demographics

Ninety percent of respondents were male, the majority (55.7%) were between 50 and 59 years of age, and Anglo (white, non-Hispanic) was indicated by 91.4% as their ethnicity. Forty-nine of the 70 respondents (70%) had spent between five and 14 years as a classroom teacher, with the largest group (47.1%) having five to nine years of experience. Slightly over 40 percent (40.6%) stated it had been 20 or more years since they were last employed as a classroom teacher. Two-thirds (66.7%) of the respondents indicated academics (language arts, history, science, or math) as their primary teaching area. A vast majority (82.9%) said they had no teaching experience in career and technology education, and an even greater percentage (88.6%) said they had no agricultural science teaching experience.

Most (58.6%) of the superintendents were found to have not been enrolled in agricultural science/vocational agriculture while in high school and/or college, and almost two-thirds (65.7%) said their children had not been enrolled in high school agricultural science/vocational agriculture. However, slightly more than two-thirds (67.1%) of the participants indicated they had some work experience in agriculture, as the largest percentage (47.1%) were found to have been raised in a rural hometown with a population of 2,500 or less.

Twenty-five respondents (35.7%) stated they had four or less years experience as a superintendent, and over 87 percent (87.1%) had 14 years or less experience as a school district's chief administrator. Most (55.7%) of the participants' school districts were located in a rural town with a population of 2,500 or fewer, with the largest percentage of superintendents (45.7%) indicating their school districts has less than 1,000 students.

Perceptions Toward the Agriscience Program

Respondents were asked to indicate their level of agreement with certain statements pertaining to their perception of the agricultural science and technology program as a whole and not as they relate to the program within their individual school district (Table 1). An 8-point Likert-type scale was provided for participants as per the following: 1 = lowest level of agreement or no agreement, and 8 = highest level of agreement or complete agreement.

Table 1

Superintendents' Agreement with Statements Regarding the Agriscience Program

Statement	Mean[a]
Instruction in agriscience needs to have more emphasis placed on technology/ computer applications.	6.9[b]
Instruction in agriscience needs to have more emphasis placed on the integration of science, mathematics, etc.	6.8[b]
Instruction in agriscience needs to have more emphasis placed on leadership development.	6.7[b]
The amount of funds currently spent on the agriscience program is a wise investment of local, state, and federal resources.	6.5
The agriscience program should provide students with specific skills needed to both become gainfully employed and pursue a higher education.	6.5
The agriscience program is useful and successful in helping at-risk students remain interested in their education, lessening the likelihood that they will drop out of school.	6.3
Instruction in agriscience needs to have more emphasis placed on biotechnology.	6.2[b]
Instruction in agriscience needs to have more emphasis placed on environmental and natural resources.	6.1[c]
Instruction in agriscience needs to have more emphasis placed on agribusiness.	6.1[c]
Agriscience is very useful in helping students to make a personal connection to, and find relevance in, non- curricula areas.	5.7
Certain courses in agriscience should be permitted to count for credit in courses such as science, speech, and economics, if the teacher completes additional training or coursework in the corresponding area.	5.7

(table continues)

Statement	Mean[a]
There would be more support for the agriscience program from administrators, teachers, parents, students, and communities if the program achieved higher standards in preparing students for higher education.	5.6
The agriscience program focuses too much attention on livestock showing.	5.5
Supervised Agricultural Experience Programs (SAEPs) are a vital component of the agriscience program that should continue as part of the program's requirements.	5.5
Instruction in agriscience needs to have more emphasis placed on horticulture/ landscaping.	5.4[c]
Instruction in agriscience needs to have more emphasis placed on animal care/health.	5.4[b]
Instruction in agriscience needs to have more emphasis placed on agricultural mechanization.	5.4[c]
Instruction in agriscience needs to have more emphasis placed on food science.	5.3[c]
Instruction in agriscience needs to have more emphasis placed on wildlife management.	5.3[c]
Instruction in agriscience needs to have more emphasis placed on plant production.	5.3[c]
The general public, especially parents, believe that students who intend to pursue a higher education after high school graduation should not be enrolled in agricultural science courses, regardless of the major and occupation they intend to pursue.	4.8
Instruction in agriscience needs to have more emphasis placed on animal production.	4.8[c]
Agriscience is less of a vocational program and more of an academic program than other career and technology education programs.	4.3
The agriscience program focuses too much attention on judging contests.	4.1
Most careers in agriculture are production-based, and the limited opportunities for students to obtain employment in this area lessens the need for agriscience programs in today's high schools.	3.8
The agriscience program focuses too much attention on production agriculture.	3.8
The agriscience program focuses too much attention on FFA activities.	3.5
A general course in agriscience should be required of all high school students to fulfill graduation requirements in the same manner that credit is required of all students in economics, speech, health, and technology applications.	3.4
Agriscience primarily a vocational program whose main function is to prepare students for immediate entry into the work force following high school graduation.	3.3
The agriscience program focuses too much attention on agricultural mechanization.	3.3
The agriscience program focuses too much attention on horticulture.	3.0[b]
The agriscience program focuses too much attention on agribusiness management.	2.6[b]
The agriscience program focuses too much attention on environmental and natural resources.	2.5
The agriscience program focuses too much attention on leadership development.	2.1

Note. N=70
[a] Mean = 1 (Lowest Level of Agreement or No Agreement) and 8 (Highest Level of Agreement or Complete Agreement). [b] N = 69, 1 missing response. [c] N = 68, 2 missing responses

The highest levels of agreement were indicated by superintendents regarding the need for more emphasis on technology/computer applications (6.9), integration of science, mathematics, etc. (6.8), and leadership development (6.7). They also agreed at a moderately high level of agreement that the amount of funds spent on programs as a wise investment of resources (6.5), and on whether the program should provide students with specific skills for both gainful employment and pursuing a higher education. The program is useful and successful among at-risk students (6.3), while more emphasis needs to be placed on biotechnology (6.2), environmental and natural resources (6.1), and agribusiness (6.1). Respondents did not believe that too much attention is focused on agribusiness (2.6) or environmental and natural resources (2.5) as a curriculum area, as well as leadership development (2.1).

Perceptions Toward Agriscience Teachers

Respondents were asked to indicate their level of agreement with certain statements pertaining to their perception of agricultural science and technology teachers as a whole and not the teacher(s) within their individual school district (Table 2). An 8-point Likert-type scale was provided for participants as per the following: 1 = lowest level of agreement or no agreement, and 8 = highest level of agreement or complete agreement.

Table 2

Superintendents' Agreement With Statements Regarding Agriscience Teachers

Statement	Mean[a]
Agriscience teachers should possess a significant level of knowledge about all phases of agriculture, as compared to a specialization in one or two aspects of the agricultural industry.	5.9
Agriscience teachers portray a positive professional image to, and have a positive professional relationship with, students.	5.9
Agriscience teachers portray a positive professional image to, and have a positive professional relationship with, parents.	5.8
Agrscience teachers portray a positive professional image to, and have a positive professional relationship with, administrators.	5.8
Agriscience teachers portray a positive professional image to, and have a positive professional relationship with, the community.	5.7
In terms of life skills and their respective content areas, agriscience teachers do as good a job as "academic" teachers do in educating students.	5.6
Agriscience teachers do a good job of equipping students with desirable employability and life skills that will enable them to be productive members of society.	5.5
Agriscience teachers tend to do a better job of educating, encouraging, and motivating lower achieving students as compared to other teachers in the school.	5.4
Agriscience teachers portray a positive professional image to, and have a positive professional relationship with, the field of education as a whole.	5.3
Agriscience teachers provide instruction to students that adequately prepares them for immediate and successful entry into the work force after high school graduation.	5.2
Agriscience teachers portray a positive professional image to, and have a positive professional relationship with, other teachers.	5.2

(table continues)

Statement	Mean[a]
In order to receive their certification, agriscience teachers should be required to pass an Examination for the Certification of Educators in Texas (ExCET) in the area of Production Agriculture.	5.2[b]
Agriscience teachers provide instructional opportunities to students that adequately prepare them to continue their education at a postsecondary institution.	5.1
Agriscience teachers are well-prepared to offer instruction at an acceptable and challenging level for students intending to pursue a higher education.	5.1
Agriscience teachers are well prepared by university agricultural teacher education programs to conduct a successful agriscience program and prepare students for a higher education or entry into the work force.	5.0
Agriscience teachers do an acceptable job of enhancing their technical and professional skills by participating in various professional development activities.	4.9
Agriscience teachers are able to provide instructional opportunities in agriscience at a level that would warrant students being able to obtain credit for science, speech, and/or economics through agriscience courses.	4.8
Agriscience teachers are able to integrate curriculum areas such as science, economics, and speech into the agriscience curriculum at an acceptable and challenging level for students of all academic abilities.	4.7
Agriscience teachers are adequately involved in the total school program and all students, and not concerned only with the agriscience program and its students.	4.5
Agriscience teachers should be employed on 12-month contracts due to Supervised Agricultural Experience Programs (SAEPs) and student participation in leadership activities, in addition to teacher participation in professional development activities.	4.5
Agriscience teachers place an acceptable level of emphasis on curriculum and instruction as compared to the amount of attention given to extracurricular activities such as FFA contests and livestock shows.	4.4
Agriscience teachers should have smaller teaching loads than other teachers due to the extra duties they are required to perform, such as SAEP visits, FFA activities, facility management, etc.	4.1[b]

Note. N=70
[a] Mean = 1 (Lowest Level of Agreement or No Agreement) and 8 (Highest Level of Agreement or Complete Agreement). [b] N = 69, 1 missing response.

Highest agreement levels were found regarding whether teachers should possess a significant level of knowledge about all phases of the agricultural industry as compared to specialization in selected aspects (5.9). Agriscience teachers portray a positive image to, and have a positive relationship with, students (5.9), parents (5.8), administrators (5.8), and the community (5.7). Teachers do a good a job in terms of teaching life skills and their respective content area when compared to "academic" teachers (5.6).

Perceived Knowledge Levels of the Agriscience Program

Regarding program funding, superintendents are very highly knowledgeable about the receipt of weighted state funding for students enrolled in agriscience courses compared to traditional academic courses (7.0). They are also quite knowledgeable in regard to the permitted use of these funds only on career and technology programs, except for allowable administrative costs (6.5). However, almost 13% (12.9%) indicated some low level of knowledge about this funding use. They are aware of the availability of federal funds from the Carl Perkins Federal Vocational Act and the use of these funds for teacher travel in certain instances (6.2).

Agriscience as a Part of the Future in Texas's Public Schools

When asked to indicate what the agricultural science and technology program must do in order to remain a part of the public school system in Texas, superintendents most commonly made some mention of a needed change related to curriculum and academics (35.4%). A change in the perception and/or image of the program was cited by slightly more than 20 percent (20.1%) of respondents, 16.7% of the responses addressed career preparation, and another 16.7% mentioned planning for and meeting future needs of students and society.

Conclusions/Recommendations

Conclusions

Superintendents in Texas are not representative of the diversity that is found in the state's general population. According to U. S. Census Bureau (2000) population estimates for 1998, the Texas population is approximately 50% female, 65% White, 23% Hispanic, 10% Black, 2% Asian American, and 0.4% Native American. This is in stark contrast with Texas public school superintendents who are predominantly White (91.4%) and male (90%). The sample did reflect the gender and ethnicity of the population, which is 88% male, 91.1% White, 7.1% Hispanic, and 1.4% African American (T. Reichle, personal communication, June 23, 2000).

As a group, superintendents in Texas represent an "older" portion of the populations in the state. The average age of the superintendent in the study was 50 to 59 years, while the median age for the state's population is 33 (U. S. Census, 2000).

Superintendents in Texas have very little recent experience as high school teachers. The average time spent as a high school teacher was 5–9 years, and the majority of the individuals have been out of the classroom for more than 20 years. Most superintendents in Texas come from an academic teaching area such as language arts, history, mathematics, or science. Most superintendents in Texas have not had lengthy experience as a superintendent. The majority has less than ten years of experience, and over one-third have four years or less. Very few have teaching experience in career and technology education or agricultural science.

Most superintendents lack "real-life" experience with agriscience programs. Although a substantial number (41%) have been enrolled in an agriscience/ vocational agriculture program or have had children enrolled in such programs (34%), most superintendents lack experience as a student or parent. Surprisingly, most public school superintendents in Texas have had agricultural work experience. Some of this is probably due to another surprising fact – most were raised in a rural environment (small town with a population of 2,500 or less).

Texas superintendents, as a group, have a positive perception of the agricultural science program and of those who teach agricultural science. They believe the amount of funds spent on agriscience programs is a wise investment of resources, and that the program provides students with specific skills needed for both gainful employment and higher education.

Most superintendents perceive themselves as being very knowledgeable about most aspects of the agriscience program. Their knowledge level is highest in areas related to funding and lower in areas related to the curriculum. In terms of perceived needs, superintendents sense a need for agriscience programs to address academics and current practices in order for it to remain a part of the Texas public school system in the future. They also perceive a need for changing the program's image to match changes in society and ensure its future.

Recommendations

Efforts should be made to attain greater diversity in the superintendent population by encouraging more female, minority, and non-foundation area educators to pursue such a position. In addition, it is recommended that a study be conducted to determine why such a lack of diversity exists in this important educational position.

Superintendents should participate in activities related to classroom teaching to stay abreast of the demands and challenges faced by classroom teachers. This would help those who are older and farther removed from their teaching experience to remain current on various issues such as changes to student demographics and instructional activities. Teachers should invite superintendents to participate in agriscience activities to increase their familiarity with the program, enabling superintendents without previous connections to agriculture or the agriscience program to develop a greater understanding and appreciation for agricultural education.

Teachers should continue to ensure that the agriscience program prepares students of all academic abilities for both gainful employment and higher education. Agriscience teachers should give greater attention to academics and current practices, as well as changing the program's image and how it is perceived, in order to solidify its place in the public school system in Texas in the future. This might require less emphasis on extracurricular activities such as showing livestock and judging contests.

Efforts should continue to be made to enable students in certain agriscience courses to receive credit for foundation courses through the use of waivers. Teachers should be willing to participate in professional development and continuing education activities that better prepare them for conducting instructional activities that warrants such waivers. Further study is recommended of administrators, foundation course teachers, Texas Education Agency personnel, and State Board of Education members to determine and address any barriers that exist in enabling students to capitalize on this educational opportunity.

The agriscience program should continue to expand its role as an academic program. While it should continue to provide students with employability and life skills, current trends dictate a move toward higher academic standards. These efforts would also improve agriscience's image with administrators, all teachers, students, parents, communities, and the field of education as a whole.

Teachers need to increase their knowledge level of the weighted funding structure, uses for weighted funding, and sources and uses of federal funds to enhance program quality. Superintendents appear to be very knowledgeable in this area and should be supportive of requests that include reference to such.

Agriscience programs should integrate more science and mathematics into its curriculum, in addition to placing more emphasis on biotechnology, technology/computer applications, leadership development, and environmental and natural resources. Teachers should recognize the need for their involvement in the total school program. Such efforts would increase the program's visibility and standing as an academic program that is concerned with helping all students become successful.

Superintendents should be made aware of the vast career opportunities in the agricultural industry to remove any stereotypes of such careers being primarily based on production agriculture. Teachers should increase their efforts to educate, encourage and motivate lower achieving students. Agriscience permits many of these students to make a personal connection to other curricular areas and find relevance in them.

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Prospective Elementary Teachers' Understandings Of Agricultural Technology and Its Effects on Culture And The Environment

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Abstract

The purpose of this qualitative study was to determine the level of understanding that prospective elementary teachers possess about biotechnology in agriculture. Based on the constructivist approach to learning and research, respondents' understanding of two nationally defined technology-focused educational benchmarks agriculture was determined. Data analysis included validating benchmarks and language that guided discourse, generating conceptual proposition maps, coding responses for comparison with expert propositions, and interpreting confirming or disconfirming patterns among informants. Informants that grew up in rural areas demonstrated a more complex understanding of the trade-offs inherent in agricultural technology, while those from urban backgrounds indicated the most concern over ethical dilemmas. Pollution of the environment as a result of pesticides was the most completely understood concept. Conversely, the informants lacked understanding concerning human manipulation of plants and animals to produce desired characteristics.

Introduction

As the number of people directly involved in agriculture has decreased, the general public's basic understanding of the food and fiber industry has declined. This dearth of understanding may be due in part to a lack of interest in agricultural issues (Weiss, 1999). However, now that biotechnology has caused "a revolution that is pushing society into rethinking what we want out of agriculture" (Johnson, 1999, p.131), an increasing number of consumers want to know about these new technologies and their effects. Concerns over food safety, environmental conservation, and agricultural sustainability are issues that need to be addressed.

Two sides emerge from the biotechnology debate. One side believes biotechnology to be a threat to the environment and cites studies to support its claims. For instance, Johnson, (1999) described how cross-fertilization from genetically modified plants to natural species could potentially create entire pastures of herbicide-resistant grasses, which could negatively effect other species of plants and animals. An actual situation that mirrors the scenario described above was the discovery of Starlink™ Bt corn in Taco Bell™ taco shells. This bio-engineered corn was only approved for animal feed, not human consumption (Environmental Protection Agency, 2000), yet it was found in the human food supply. Such potential and current problems erode public trust in policy makers that protect the food supply (Hennen, 1995, p.94).

Despite some setbacks, biotechnology advocates support their claims based on the potential benefits this technology offers. They argue that biotechnology reduces herbicide use, increases yields, adapts plants to the environment instead of the environment to the plant, produces healthier foods, and decreases disease. They respond to those who believe that biotechnology and genetically modified crops will destroy sustainable agriculture by saying just the opposite. Johnson (1999) has argued that in its present form "intensive agriculture…is probably not sustainable" (p.132) and that biotechnology decreases the negative environmental impact. He stated that, " …although the *levels of production* may be sustainable…the *social, environmental, and economic consequences* …may not be sustainable…." (p.132) [emphasis added by original author]. It is obvious that the debate between supporters and opponents of biotechnology will continue.

Most will agree, no matter which side they are on, that this new technology is not without risks, but with these risks also come benefits. Betsch (1996) and Weiss (1999) argued that the public needs to be informed of both risks and benefits in order to form a personal opinion on biotechnology. Ultimately, the public will decide what technologies will be used and which will stay on the drawing board (van Duijn, 1995). In order for the public to make informed decisions their "opinions must be based on a proper sensitivity to and knowledge and understanding of the issues " (Ingram, 1992, p.123).

Education can foster public understanding of biotechnology. Scientists agree that education is the key to the continuation or the demise of the use of biotechnology (Betsch, 1996; Ingram, 1992; Weiss, 1999). Ingram (1992) contended that education should not only be directed to the adult public but also at primary school children, because they are future consumers. In order to educate children, however, elementary school teachers need to possess understandings of basic scientific and technological principles undergirding biotechnology. A reasonable way to bring relevance to biotechnology is through the food we eat and the fiber we use. Agriculture and science educators agree and have included agri-food systems concepts in the curricula (American Association for the Advancement of Science, 1993; Leising & Igo, 1998).

This study focuses on determining the extent and depth of prospective elementary teachers' understandings of ninth through twelfth grade benchmarks that deal with the science and technology of agriculture. The researchers examined understanding of the trade-offs of technology and how humans alter plants and animals to produce the characteristics they value. Understandings of such concepts are constructed through experiences at the individual level. Therefore, this study's theoretical framework is based on constructivist theory. Constructivists believe that learning is a process of building meaning (Merriam & Caffarella, 1999). In this case, meaning is used to describe the sense making process which people undergo as they struggle to understand. Early constructivist theory was based on Piaget's (1952) work with children, which was later used to describe the process of learning more generally.

In science education, researchers have taken Piaget's work further by comparing learner conceptions (built by connecting schema) with those of experts to determine the accuracy of idiosyncratic understandings (Driver, Guesne & Tiberghien, 1985). The ultimate goal of much of this research was to unearth and make apparent learner schema related to complex understandings. By comparing multiple learner understandings, researchers have identified naive or misconceptions that may hinder the construction of new schema that more closely resemble expert conceptions (Glynn, Yeany, & Britton, 1991). This line of research has direct implications for agricultural education, because researchers presently know little about the idiosyncratic understandings that constitute agri-food system literacy. Agricultural education researchers have not yet defined the cognitive structures that build a foundation for literacy. This study has direct utility in unraveling what prospective teachers understand about biotechnology.

Purpose/Objectives

The purpose of this qualitative study was to determine what eight prospective elementary teachers understand about agricultural and science education national benchmarks related to the agri-food system. More specifically, this study sought understandings of benchmarks related to technology in agriculture and its effects on human culture and the environment. The objectives of this study were: (1) to determine informants' backgrounds, and (2) to compare prospective elementary teacher understandings with expert understandings for the role of science and technology in the agri-food system.

Methods/Procedures

In agricultural education, abundant knowledge and positive perceptions gleaned through survey research are often equated with literacy. Frick and Wilson (1996) have suggested, however, that one's literacy involves, not simply a cache of facts, but "a basic understanding of agriculture" (p. 59). To gain firm evidence of understanding, the researchers employed a qualitative protocol for inquiry that combined grounded theory (Strauss & Corbin, 1990) and cognitive anthropology (Hamilton, 1994) so as to propose theory about what prospective teachers understand about technology benchmarks. This methodology—although new to agricultural education research—has been used by science education researchers for nearly two decades (Posner, Strike, & Gertzog, 1982; Smith, 1991) and compliments previous scholarship in agriculture literacy for our profession.

The population for this study included eight purposefully selected prospective elementary teachers who were of either junior or senior standing in college. Prospective teacher selection was based on educational background. Students were sought who had little university science coursework, because they are representative of most elementary educators (Fortenberry & Powlik, 1998; Zembal-Saul, Blumenfeld, & Krajcik, 2000); however, one participant minored in science.

To ground the interviews in previous scholarship, the researchers developed a synthesis of technology educational benchmarks from the disciplines of science (American Association of the Advancement of Science, 1993) and agricultural education (Leising & Igo, 1998). Members of a land-grant university's Science Education and Agricultural Education departments reviewed interview prompts and the research protocol. Clinical interviews were used to surface informant understandings of the benchmarks. In each 45-minute interview, approximately five minutes were spent determining demographic background; the remaining time probed student understanding of benchmarks. These videotaped and transcribed interviews served as the primary data sources. Secondary data consisted of the researchers' field notes and any materials generated by the interviewees.

In this study two different strategies were used to analyze data. First, demographic information was reported descriptively. The second strategy used Hogan and Fisherkeller's (1996) technique for representing highly complex thinking to ascertain understandings of technology benchmarks. A bimodal coding scheme was used to represent student thinking. The sophistication of thought was judged by comparison with expert propositions for subconcepts along two dimensions: quality (compatibility) and depth (elaboration). Analysis of data involved four phases. First, the researchers developed expert propositions based on the science and agricultural education benchmarks. Science and Agricultural Education faculty reviewed the propositions for accuracy. With this feedback, expert propositions and goal conceptions were developed. Table 1 lists the key concept, benchmarks, and language needed for discourse.

Table 1

Benchmarks for Science and the Food and Fiber System Literacy Framework

Key Concepts	Benchmark	Language
A. What is the role of science and technology in the food and fiber system?	Describe how new varieties of farm plants and animals have been engineered to produce new characteristics.	genetic engineering, cloning, natural selection, multiple births, gene transfer, seedstock production,
B. How has the modern agri-food system impacted society	Describe trade-offs inherent in the use of agricultural technology in terms of environment and human culture.	sustainability, loss of culture pesticides, fertilizers, employment, pollution,

In the second phase of analysis, raw data from student interview tapes were analyzed by generating conceptual proposition maps. These maps served as summary portrayals of prospective teacher thinking for each benchmark. Maps were verified for accuracy by comparing them repeatedly with primary data sources (interview tapes) and with the secondary data sources (field notes and products developed by informants). Each tape was viewed a minimum of four times. This "persistent observation" helped the researchers verify the trustworthiness and credibility of interpretations (Lincoln & Guba, 1986). To ensure confirmability (Guba & Lincoln, 1989), another researcher coded data with 99% agreement with the primary researcher.

Phase three focused on coding prospective teachers' responses. The sophistication of thinking was judged by comparison with expert propositions. Informants' understandings were coded based on this scheme (Table 2).

The final phase of analysis sought confirming and disconfirming evidence of patterns among individuals (Miles & Huberman, 1994). This was accomplished by two procedures. First, each benchmark was analyzed across individuals. And second, holistic portraits of informant thinking were analyzed to ascertain how understanding of subconcepts might influence other benchmarks. Patterns within the data were then ascertained by comparing individuals.

Table 2

Coding Scheme to Compare Propositions with Experts

Code	Description
CE (Compatible Elaborate)	Statement concurs with the expert proposition and has sufficient detail to show the thinking behind the concepts articulated.
CS (Compatible Sketchy)	Statement concurs with expert propositio n but lacks essential details. Pieces of facts are articulated but are not synthesized into a coherent whole.
CI (Compatible/Incompatible)	Sketchy statements are made that concur with the proposition, but are not elaborated upon. At other times, statements contradict proposition.
IS (Incompatible Sketchy)	Statements disagree with the proposition but provide few details, and are not recurring. Responses appear to be guesses.
IE (Incompatible Elaborate)	Statements disagree with proposition, and students provide details or coherent, personal logic supporting them. Same or similar statements/explanations recur throughout the conversation.
N (Nonexistent)	Students respond, "I don't know" or do not mention the topic when asked a question calling for its use.
ø (No Evidence)	A topic is not directly addressed by a question, and students do not mention it within the context of response to any question.

Findings/Discussion

Research Objective 1: Background of prospective elementary teachers.

Objective one focused on prospective elementary teacher background. The eight informants included three males and five female s of white, European ancestry. Their schooling varied with two having attended Catholic school, while the others attended public school before college. All informants attended a land-grant university and majored in elementary education, but had various minors. Place of origin was not a selection criteria, however, three students came from rural backgrounds, three from the suburbs, and two from a major metropolitan city. Occupations of their parents varied. Table 3 displays prospective teachers' backgro unds.

Table 3

Background of Prospective Teacher Informants

Name	Gender	Ethnicity	School Background	Raised	Parents' Occupation
Sid	Male	European American	Public School El Ed, Social Studies	Suburb	Father- Electrician
Kat	Female	European American	Public School El Ed, English	Suburb	Mother- Teacher Father- Landscape architect
Molli	Female	European American	Catholic School El Ed, Special Ed	City	Mother- Pre-school teacher Father- Teacher
Kara	Female	European American	Catholic School El Ed, English	Rural	Father- Farmer
Di	Female	European American	Public School El Ed, English	City	Father- Detroit civil servant
Dan	Male	European American	Public School El Ed, Agriscience	Rural	Father- Hardware store owner
Guy	Male	European American	Public School El Ed, Social Studies	Suburb	Father- Janitor Mother- Sales clerk
Meri	Female	European American	Public School El Ed, Social Studies	Rural	Mother- Real estate agent

Research Objective 2: Prospective teacher understandings of technology related benchmarks.

The second research objective focused on prospective elementary teacher understandings of benchmarks related to (1) engineering of plants and animals to produce new characteristics, and (2) trade-offs of agriculture technology in terms of the environment and humans. In this section, the subconcepts necessary to understand benchmarks are displayed along with prospective teacher compatibility with expert conceptions.

Benchmark 1. Describe how new varieties of farm plants and animals have been engineered to produce new characteristics.

Table 4 illustrates prospective teacher understandings of the role of science and technology in the agri-food system.

Sid, Kat, Kara and Meri were coded Compatible-Sketchy and understood that humans selected desired traits in farm plants and animals and then employed strategies/technologies to produce these valued characteristics. They mentioned reproductive techniques, such as selective

Table 4

Prospective Teacher Understanding of Science and Technology's Role in the Agri-food System.

Benchmark	Sid	Kat	Molli	Kara	Di	Dan	Guy	Meri
1) Selection of desired characteristics								
a) cloning	•	•						•
b) selective breeding	•	•		•				•
c) cross breeding				•				
d) gene transfer								
Coding	CS^{+2}	CS^{+2}	N	CS^{+2}	N	Ø	N	CS^{+2}

ø--No evidence; N--Nonexistent; IE--Incompatible Elaborate; IS--Incompatible Sketchy; CI--Compatible/Incompatible; CS--Compatible Sketchy; CE--Compatible Elaborate
Superscript indicates depth of understanding of subconcepts.

breeding of seedstock, crossbreeding and hybridization, grafting in plants, and cloning. Interestingly, both Meri and Kat mentioned ethical concerns that cloning posed for them; Kat said it was "kinda God-like." Meri's conversation about cattle genetics displayed her understanding of selective breeding, while bringing to the fore her concern over cloning:

Meri- I know Angus beef is supposed to be the best.
Interviewer- Do you have any idea why?
M- Well they're supposed to be corn fed. They're supposed to have less fat in their meat. Just a better type of cow I guess. Probably genetically bred to be better, to have less fat.
I- Can you tell me about that - how would they do that?
M- Well they probably pick the cows with the best traits and use those for breeding.
I- Can you think of anything else that maybe, any other technologies maybe that you've heard of that people might use now or possibly in the future to be raising and selecting?
M- Cloning.
I- Tell me about that.
M- I don't know – I think it's kind of weird. I mean, you're altering life.
I- What's cloning though?
M- Making the same identical thing over and over again, basically.
I- How would you do that?
M- Test tubes. Select the, chromosomes or what needs to be, you know, selected so that they can reproduce the same thing basically over and over again.

I- Why would they do that?

M- Well cause the one that they, you know, the one they're reproducing is probably the one they feel is the best cow – Angus beef.

I- OK, so they're going to produce the best one over and over again. Can you think of anything – so what's the advantage of that?

M- Well they would just – if you're getting the same thing over and over again – you don't have to worry about, you know, genetic defects if you're going to be cloning – it won't be something that they're going to worry about whether all their cattle were going to be this quality of meat that their putting on the label.

I- OK, can you think of any disadvantages?

M- Ya, you're altering human life, you're messing with something that I don't think that was probably meant to be altered or changed.

I- OK, so what about, why isn't it meant to be altered or changed? And you talked about human life or animal life?

M- Well most people don't think cloning is so bad because you don't really, I'm, if you clone a human, I'm, will it have the same personality, will it look exactly the same, are you making a twin? You know, it's not really a twin – it's a clone. It just seems [inaudible].

I- OK, let's go back. It sounds like you have a moral concern dealing with cloning of humans.

M- It seems kind of weird.

I- So let's go back to the livestock part. What's the disadvantage of that?

M- I don't, we haven't done too much with it. It could, eventually, I don't know. It could eventually lead to something that we hadn't predicted.

On the other end of the understanding continuum were those with Nonexistent understandings – Molli, Di, and Guy. Guy and Di did mention that animals could be different from each other, but did not know how humans could perpetuate this differentiation with breeding schemes. Molli did not indicate that she had any understanding of the concepts listed in this benchmark. Di's discussion on the differences between dairy and beef cattle is noteworthy. She believed that there were differences between these two types of cattle, and rightfully so, but she didn't know how they got that way. She didn't see the connection between these animals and the humans who bred, and continue to design and breed, these animals for the traits they value. Di stated:

I- So, are there differences between the dairy ones and the meat ones [she was discussing dairy and beef cattle]?

D- I think that they are both capable of producing milk, but I think that the dairy cows produce more milk.

I- How?

D- I would think that just genetically. Like sort of a different line of cows.

I- So tell me a little bit more about that genetic thing.

D- I'm trying to think about what I can compare it to. I just think that there is sort of like a different breed of cow; I guess.

I- How did they get that way?

D- Um, I don't know. [Laughs], I don't know.

I- You talked a little bit about a line of cow, well, tell me about that.
D- Still the same sort of concept. I'm not sure how they got that way, but I think.
I- How do they stay that way?
D- Well, I was under the impression that dairy cows, once you start milking them, that if you don't milk them, that they get sick. You know from keeping all that milk inside. So, I would think that once they are producing a lot of milk that they keep producing that amount and you need to milk them [laughs].

Table 5 shows that most informants, with the exception of Sid and Di, articulated a Compatible-Sketchy understanding of the environmental aspect of the expert conception. The conception included: (a) altering the physical and biological world to maximize output of selected organisms (limiting diversity) and promoting the use of an unsustainable agri-food system based on non-renewable resources, and (b) increasing changes of externalities of production by polluting the environment.

Table 5

Prospective Teacher Understanding of The Impacts of the Modern Agri-food System on Society.

Benchmarks	Sid	Kat	Molli	Kara	Di	Dan	Guy	Meri
1) Environment								
a) sustainability	•							
b) pollution	•	•	•	•		•	•	•
Coding	CE^{+2}	CS^{+1}	CS^{+1}	CS^{+1}	N	CS^{+1}	CS^{+1}	CS^{+1}
2) Human Culture								
a) labor	•	•		•	•	•	•	•
b) population shift	•	•		•	•	•		•
c) dependency on machines/science	•	•	•	•	•	•	•	•
Coding	CE^{+3}	CE^{+3}	CS^{+1}	CE^{+3}	CE^{+3}	CE^{+3}	CS^{+2}	CE^{+3}

ø--No evidence; N--Nonexistent; IE--Incompatible Elaborate; IS--Incompatible Sketchy; CI--Compatible/Incompatible; CS--Compatible Sketchy; CE--Compatible Elaborate
Superscript indicates depth of understanding of subconcepts.

Benchmark 2. Describe trade-offs inherent in the use of agricultural technology in terms of environment and human culture.

Relative to the first component of the environmental expert conception, no informant, except Sid, mentioned the trade-off caused by selecting only the most immediately beneficial plants and animals for production, thus reducing sustainability. In the second part of this benchmark, everyone, except Di, knew of the trade-off of using technologies and polluting the environment. In fact, their responses were quite elaborate as evidenced by Kara's response. She seemed to be aware of the trade-offs involved in the use of pesticides, but she was somewhat skeptical of their deleterious effects on her health.

I- What are the positive things about pesticides and what are some of the trade-offs, some of the negative things about pesticides?

K- Positives are you get more crop. You harvest more, because I know a lot, some of the bugs will like eat you, I mean like, eat the whole thing. Like just ruin everything. Whether they lay eggs in it and make it their home, or whether they just eat it themselves; they'll ruin it. So that's a positive. I don't know but I want to say there's some kind of pesticide too, so that it can be kept longer, but I don't know that. The negatives are, they don't wash them off, like the producer, um, like the packer, might rinse the lettuce off, but I know they don't do a very thorough job of it. I'm sure that it's just on a conveyer belt and they have water or whatever spraying on it and so it's not going to rinse all the pesticides off. And I know like lemons, they don't because there's a skin on lemons; they don't rinse those off. I have a friend who won't drink water with lemon in it at a restaurant because they don't wash the pesticides off the lemons. And I'm sure that part of it seeps into it. It effects it in some way. But, I mean, it's not harmful, because they, it's tested. So to a certain degree it might be harmful, but not anything like if that was the only thing in your diet.

I- So why would it be a big deal if there were pesticides on that lettuce or lemon?

K- Because they're pesti..., toxins. They're toxic and some people are just paranoid. Like, if it doesn't kill, it's all right. I guess, I mean, if I'm not getting cancer from it or something like that, I'm OK. Some people are just real careful about what they put in their bodies, and I guess they rightly can be.

I- Any other trade-offs?

K- I know they use pesticides on a day that's not so windy, but because it's a pesticide it might get into the water. It will be in the soil, so it might filter through and get in the water somehow.

Prospective teachers articulated a deeper understanding of technological trade-offs on human culture than they did for the environment. Six informants understood all three parts of the goal conception which included technological trade-offs in: (1) labor resulting in less time required for food production and preparation, and an increase in urban culture; (2) population shifts resulting in a decline of rural culture and a disconnection from the land; and (3) dependency on machines and science resulting in greater productivity, misunderstanding and fear. As indicated in Table 5, Sid, Kat, Kara, Di, Dan and Meri were coded as Compatible-Elaborate because they understood all three parts of the goal conception.

Compatible-Sketchy codings were assigned to Molli and Guy. Both indicated that humans had become dependent on agricultural technology and that there were risks associated with its use. However, they did not articulate an understanding of society's loss of rural culture and of city dwellers' disconnection from the land. Additionally, Molli did not speak of the time savings that resulted from agricultural technology. Guy's response indicated he did not understand the population shift resulting from use of technology.

I- Has it [agricultural technology] effected people's lives?

G- The technologies? I can't, I don't think so, because to me, it's like, I guess they've always grown, I don't think so, because there's always been land set for growing vegetables and stuff, and raising cattle. I don't think that's pushed people away or drawn people.

Conclusions/Implications

Informants who grew up in rural areas demonstrated the most compatible and elaborate discourse relative to the cultural trades-offs inherent in the use of agricultural technology. The informants raised in urban areas were less balanced in their understanding and spoke more wearily of trade-offs. Generally, as a group, those from suburbs and cities also spoke more about the detrimental effects of these technologies than they did about the benefits.

Further research can yield deeper understandings of what people know about the agri-food system. Specifically, additional use of this study's research protocol by other researchers on similar, but different groups, for example, can add to the particularizability of findings (Erickson, 1986). Particularizability refers to the taking of particulars from one situation and comparing them to other similar situations; it is akin to generalizability in quantitative research. These studies might target areas where non-and misconceptions are present.

This study's prospective teachers had constructed cognitive structures that were primarily based on a fear of pesticides and the pollution that they had heard these technologies cause. On the other hand, the majority had no understanding of other technologies, such as gene transfer in plants and animals, that biotechnology advocates suggest can decrease the use of chemicals that pollute the environment—the same chemicals that these prospective teachers so gravely feared. It appeared that these prospective teachers were not well enough informed to assess the risks and benefits of new agricultural technologies. This supports biotechnologists' (Betsch, 1996; Weiss, 1999) contention that people lack adequate knowledge and understandings necessary to make informed decisions with regard to biotechnology.

This study underscores the need for an enhanced curriculum for prospective teachers because they lack what Shulman (1986, 1987) has referred to as pedagogical content knowledge (PCK). If teachers lack PCK, they are unable to create learning opportunities that make content more comprehensible to children, thereby limiting students' ability to learn content in meaningful ways (Zembal-Saul, Blumenfeld, & Krajcik, 2000). However, acquiring agri-food system PCK is not an easy task. Mascarenhas (1997) has argued that weighing the risks and benefits of technologies is especially difficult because it encompasses not only science, but ethics and economics as well. Therefore, to help prospective teachers grasp these complex understandings, science and social science methods courses could emphasize the integration of ethical and scientific content related to agricultural biotechnology. If prospective teachers do not understand how humans use science and technology to design the crops they value, how will their students gain such understandings?

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Attrition Rate In A Swine Continuing Education Course Delivered Asynchronously

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Abstract

The purpose of this study was to determine, what learner characteristics, instructional design techniques, and technological comfort levels influenced attrition rates in an asynchronous learning environment.

After conducting a qualitative analysis of the data, the researcher was able to address the seven research questions posed in this study which dealt with four barriers thought to impact attrition rates. Situational and dispositional barriers are within the control of the learner such as lack of time, lack of a clear goal, time management, and attitude towards course content. Epistemological and institutional barriers are within the control of the institution and/or course designer and include quality and difficulty of course content, course availability, institutional procedures, and diversity of academic disciplines. The data suggested:

Situational and dispositional barriers contributed to the high attrition rate in this course. Busy schedules at work and home prevented learners from working on the course in a timely manner. The basic nature of the course content and the learners' attitude toward the content also played a role in the high attrition rate in the course.

The primary epistemological barrier found to influence attrition rate was the elementary level of the course content. While the researcher found sound instructional design techniques were used in the development of the course, the designers failed to take into consideration that more advanced producers might enroll in the course. No institutional barriers found to contribute to the non-completion of the course.

Completers and non-completers displayed little difference in technological ability; however, the researcher discovered differences in learner characteristics. Completers were found to be persistent. Non-completers tended to procrastinate and allowed other events to take precedence.

Suggestions for improvement to the course included: speeding up the pace, increasing difficulty level, incorporating learner interaction, advertising, shortening the length of time to complete, and adding additional reference material to the course content.

Introduction

Rapid advances in technology and distance education have provided a way for educators to reach more learners, regardless of time or place. Examples of these technologies include satellite, videoconferencing, and web-based learning environments.

World Wide Web Course Tools, or WebCT, is one of the newest innovations used in the web-based learning environment. "As of September 1999, WebCT has more than 3.6 million student users in 97,000 courses at over 800 colleges and universities in more than 40 countries" (WebCT, 1999, company). Students who use WebCT have the ability to access course content, take quizzes, submit homework and interact with instructors. "By offering a rich suite of course tools, WebCT enables instructors to quickly and easily create and customize their courses" (WebCT, 1999, company).

These web-based courses are not limited to one content area, rather more disciplines are seeking the advantages that web-based courses have to offer faculty and students. Agricultural education is one area in particular that is at the forefront of these distance- learning technologies. Several studies have been conducted in order to determine faculty perceptions of web-based courses. These studies also look at the quality of the courses and the effectiveness they have on the learner (Day, Raven and Newman, 1998; Nti and Bowen, 1998; Born and Miller, 1999; Miller and Pilcher, 2000).

National Pork Producer's Council (NPPC) offered a continuing education, self-study farrowing management course available on the Internet as a WebCT course through NPPC's website (NPPC, 1999, producermain.html). This thirteen-week course was part of the Distance Learning Project, a program that was implemented by NPPC in 1998. The farrowing management course consisted of 10 lessons and incorporated a self-graded quiz with each lesson. The learner was allowed three attempts at the quiz. The lessons were self-paced and designed to be completed in about one hour. Participants who registered for the WebCT course was assigned a user name and password that gave them access to the farrowing management course. After all 10 quizzes were completed, the learner was then asked to fill out an on-line evaluation form. The learner was awarded a certificate at the end of the course.

NPPC first offered this course in the spring of 1999. Of the 84 participants enrolled, 23 completed the 10 lessons in the course. When the course was offered again the following fall, 133 people enrolled in the course, and 77 completed all 10 lessons. Even though distance education offers many opportunities to learners outside university walls, the completion rate of courses offered via distance education is lower than the completion rate in those courses offered through traditional modes.

Theoretical Framework

In order to develop a full understanding of the high attrition rate within distance education programs, it is important to first understand the characteristics of the adult learners and their reasons for participating in these programs. It is also necessary to incorporate instructional design, technological exposure, and barriers to course completion in relation to attrition rate.

Knowles, Holton, and Swanson (1998) define the characteristics of adult learners and their reasons for learning:

1) The need to know. Adults need to know why they need to learn something before undertaking to learn it. Adults should be made aware of how a learning situation can be applied toward real world experiences that in turn makes learning more meaningful.
2) The learner's self-concept. Adults have a self-concept of being responsible for their own decisions, for their own lives. Once they have arrived at that self-concept they develop a deep psychological need to be seen by others and treated by others as being capable of self-direction. They resent and resist situations in which they feel others are imposing their wills on them.
3) The role of the learner's experience. Adults come into an educational activity with both a greater volume and a different quality of experience from youths. These experiences lead to a diverse audience in any adult group setting. Background, learning styles, motivation, needs, interests, and goals vary to a large degree, and while the same is true of a group of youths, the big difference here is the emphasis on the individualization of teaching and learning techniques in adult education. Greater experience can also have some negative effects as well. Throughout a lifetime a person tends to develop mental habits, biases, and presumptions that tend to inhibit that individual from alternative ways of thinking and developing new ideas and different perceptions.
4) Readiness to learn. Adults become ready to learn those things they need to know and be able to do in order to cope effectively with their real-life situations.
5) Orientation to learning. Adult learners are life-centered in their orientation to learning. Adults are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or deal with problems that they confront in their life situations. Furthermore, they learn new knowledge, understandings, skills, values, and attitudes most effectively when they are presented in the context of application to real-life situations.
6) Motivation. While adults are responsive to some external motivators (better jobs, promotions, higher salaries), the most potent motivators are internal pressures (the desire for increased job satisfaction, self-esteem, quality of life). Motivation may be blocked by an adult's negative self-concept as a student, time constraints, and programs that violate principles of adult learning (pp. 55-61).

A primary concern of adult programs delivered at a distance is the high attrition rate. Many studies have been conducted in order to explain this phenomenon. Garrison (1987) believes that the reason for these studies is due to the need to show that "distance education is an effective and viable method of structuring and delivering education" (p.

95). A more important reason for these studies is the need to understand the characteristics of the distance learner in order to better design and deliver distance educational programs. Results from these studies "will not only ensure a better quality of program for current students but should also suggest means of improving access to educational programs and learning" (p. 95).

It is also important to recognize that attrition cannot and should not be attributed to one factor and that reasons for withdrawal are complex and interrelated (Bernard & Amundsen, 1989; Garrison, 1987; Kember, 1989; Morgan & Tam, 1999; Morgan & Littlewood, 1998; Powell, Conway, & Ross, 1990; Woodley & Parlett, 1983; Woodley, 1987). Barriers to learning and participation can be classified under three headings: situational, institutional, and dispositional (Cross, 1981). Other studies that have been conducted identify the same barriers but add an epistemological variable that creates difficulties for the learner and has an impact on his/her ability to complete a course (Enckevort, Harry, Morin, Schutze, 1986; Garland 1993; Gibson & Graff, 1992; Morgan & Tam, 1999; Woodley & Parlett, 1983). *Situational* barriers include a poor learning environment, lack of time due to work or home responsibilities and geographic location. *Institutional* barriers include cost, problems with institutional procedures, course scheduling, course availability and tutorial assistance. *Dispositional* barriers include lack of a clear goal, stress of multiple roles, time management, learning style differences, adult pride (interest, motivation and attitudes toward school and content), psychological, social and economic factors. *Epistemological* barriers are concerned with the diversity of the different academic disciplines such as the research paradigms and communication techniques. All four factors have an impact on persistence in completing a distance education course.

When educating adults in distance learning environments using technological tools such as computers, it is important to address the question of "which methods of instruction and learning are particularly suited to adults' ways of learning" (Enckevort et al., 1986, p. 33). Galusha (1998) cited lack of technological training for the student as a barrier to learning in a distance education environment. Students who lack computer or writing skills may be inadvertently excluded from a course using an electronic medium as a delivery method. Students taking distance learning courses that require them to work on a computer must be taught the fundamentals of operating the system of choice of the course. "If distance learning is to be successful, technical barriers must be made a non-issue" (p. 11).

The issue of self-efficacy, "perceptions about one's capabilities to organize and implement actions necessary to attain a designated performance of skill for specific tasks" (Oliver & Shapiro, 1993, p. 81) is believed to be able to provide a "foundation for developing positive strategies for introducing computer-related skills" (p. 81). Oliver & Shapiro (1993) noted that few studies had been conducted concerning the concept of computers and self-efficacy, but among the studies most revealed that "those who possess a high degree of self-efficacy tend to be higher achievers than those who have a lower degree of self-efficacy" (p. 83).

The use of learner-centered strategies in web-based instruction is expected to lead to better instructional designs and improved andragogical practices (LeJeune, 1998). Intentional learning, self-direction, collaboration, and self-reflection which are commonly practiced in adult instruction may now be adapted to on-line courses. Dick and Carey's (1996) systematic instructional design model is one example of the steps one could follow in designing instruction. It consists of 10 steps: 1) determining the instructional goal; 2) analyzing the instructional goal; 3) analyzing learners and context; 4) writing performance objectives; 5) developing assessment instrument(s); 6) developing instructional strategies; 7) developing and selecting instruction; 8) designing and conducting formative evaluation of the instruction; 9) revising the instruction; and 10) conducting a summative evaluation (pp. 5-7). This model was selected to determine if the course developers followed a systematic approach to designing the Farrowing Management Course on WebCT.

Purpose of Study and Research Questions

The purpose of this study was to evaluate how the interrelationships among learner characteristics, systematic instructional design, and technological comfort levels influenced the completion rate of a NPPC Farrowing Management course delivered via WebCT.

The following research questions were addressed in this study:

1) Were there differences in adult learner characteristics (situational and dispositional barriers) between completers and non-completers of the WebCT Farrowing Management Course?
2) Were there differences in perception of the appropriateness of course design (dispositional and epistemological barriers) between completers and non-completers of the WebCT Farrowing Management Course?
3) Were there differences in prior technological exposure and technological self-efficacy between completers and non-completers of the WebCT Farrowing Management Course?
4) What were the components of systematic instructional design that course designers implemented during the development of the WebCT Farrowing Management Course?
5) What were the suggestions made by course designers, completers, and non-completers for improvement of the WebCT Farrowing Management Course?

Research Procedures

The research for this study was conducted nationally in 15 states in the United States. The sampling technique used for this study was a qualitative method known as representative sampling. Representative sampling is "representative of a population to which it is desired to generalize" (Lincoln & Guba, 1985, p. 200). "Gatekeepers" were utilized in order to identify the course developers, completers, and non-completers of the course.

Qualitative research was the methodology. A semi-structured interview (with an interview protocol specific to completers, non-completers and course designers) and document analysis (an evaluative review of the WebCT course and an on-line evaluation collected by NPPC) served as the data-gathering sources. The researcher was the data-gathering instrument.

The interviews were conducted by telephone and were recorded and transcribed for future data analysis. The researcher continued to conduct interviews from both the completers and non-completer populations until the interviews failed to turn up any new data. Respondents were coded to ensure confidentiality with initials representing course developers (CD), completers (C), non-completers (NC), and non-completers who completed no lessons (NCN). A number followed to indicate the interview order. See Table 1 for the list of respondents.

The researcher used the constant comparative method to compare across categories and construct meaning (Lincoln & Guba, 1985). From this analysis, the researcher determined the relationships of how learner characteristics, technological comfort and instructional design influenced the completion rate of a web-based course.

Table 1

List of Respondents in Study

Group	N	Code
Course Designers	5	CD1, CD2, CD3, CD4, CD5
Completers	15	C1, C2, C3, C4, C5, C6, C7 C8, C9, C10, C11, C12, C13 C14, C15
Non-Completers Non-Completers-No Lessons	11	NC1, NC2, NC3, NC4, NC5 NC6, NC7, NC8, NCN1, NCN2 NCN 3

Findings

The complete findings were written as case studies in three sections: course designers, completers, and non-completers. A summary of findings follows:

Course Designers

The course was developed out of a need for the National Pork Producer's Council and the Agricultural Extension Service to work more closely in order to provide educational tools for anyone interested in expanding their knowledge about important issues in pork production such as farrowing management, breeding and gestation, nutrition, growing to finish, and nursery care.

Course designers wanted to create a course that would allow individuals to have access to information anytime and anywhere with the ability to work on it at their own pace provided they had a computer with access to the Internet. The purpose of the WebCT Farrowing Management Course was to provide producers with the information to perform their jobs better than before and to carry out their work more efficiently.

Although course designers did not specifically adopt an instructional design model, such as Dick and Carey's Systematic Instructional Design model, all of the steps in Dick and Carey's model were present to some degree.

1) Determining the Instructional Goal: Course designers used a variety of methods to determine the subject material to be used for the course. Initially, course designers met in Iowa to develop a list of learning objectives. A second method used by course designers in order to determine course content was a technique called visualization – seeing themselves as workers in a farrowing house.
2) Analyzing the Instructional Goal: The entry level skills required of the learner in order to succeed in this course were minimal; a desire to learn, a love for animals, the ability to read and write, and computer skills, although not mentioned in the course overview, were required of the learner prior to enrolling the course.
3) Analyzing the Learners and Context: On-line quizzes were created and implemented at the end of each lesson in order to analyze the learner and measure how much learning had taken place. The course designers were not able to incorporate any hands-on activities for the learners, but believed that the on-line quizzes were a way to provide the learner with something to do after they completed a lesson, and it provided the learners with feedback regarding their progress in the course.
4) Writing Performance Objectives: Performance objectives were identified to the learner at the beginning of each lesson, providing the learner with expected outcomes of each lesson.
5) Developing Assessment Instrument(s): Course designers developed on-line quizzes in order to assess the learners.
6) Developing Instructional Strategies: The course was converted to a web-based format by one individual, CD5, and a student worker by converting the print based material, videos, pictures and slides into digital formats and placing everything on-line in an easy to follow format.
7) Developing and Selecting Instruction: The instructional materials were derived from the course designers' determination of what was important for producers to know and learn about farrowing management in order to have a well functioning

farrowing house. The expected outcomes of the course were two-fold: course designers wanted learners to understand the reason behind their actions and to enhance their job skills in order to continue to strive in the area of swine production. Course designers did not; however, develop and select instruction for the audience that actually enrolled in the course. This course was developed with the novice producer in mind and little consideration was given to the possibility of the more advanced producer enrolling in the course seeking more detailed information.

8) Designing and Conducting Formative Evaluation of the Instruction: Course designers used several methods to evaluate the course content. They used experts in the area of farrowing management to review the material for accuracy, conducted workshops and used the course content to teach them, and offered the course as a pilot study on-line to obtain feedback from the learners for suggestions for improvement.
9) Revising the Instruction: The instruction was revised from the feedback received from the formative evaluations from the workshops, pilot course, and swine experts.
10) Conducting a Summative Evaluation: The summative evaluations were collected at the end of the course and provided a way for course designers to continue to revise and improve the instruction.

Certificates were awarded to the learner upon completion of the course. Although the certificates did not have any educational credit attached, the course designers felt it was important to acknowledge those who had completed the course successfully.

Completers

The audience for the completers ranged from the novice pork producer (C14) to the expert. There were a few college instructors enrolled in the course (C4, C12), a pre-vet student who worked as a farrowing technician (C7), an instructional specialist (C5), several farrowing house managers (C1, C8, C13, C15), a feed salesman (C3), farrowing house employees (C6, C9), and several individuals who were self-employed and had been in the business for many years (C2, C10, C11).

The majority of the completers asked for more scientific or technical content and viewed the course as a refresher course; good for training new comers, but leaving the experts wanting more (C1, C2, C3, C4, C5, C7, C8, C9, C12, C13, C14, C15). Based on the interviews with the course designers, the course content was developed for the novice producer (CD1, CD3, CD4).

All of the completers ranked this course middle to high priority on their list and maintained a schedule in order to work on the course (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15). Even though several completers expressed that the content was not scientific or technical enough, they continued on with the course because they had enrolled in the course, paid for it, and were determined to finish what they started (C1, C2, C3, C4, C5, C14, C15). Five completers also expressed their concern with answers to a few of the quiz questions believing that it was probably a matter of opinion on technique (C8, C9, C12, C13, C14).

With the exception of two completers, this was the first time anyone had enrolled in a web-based course (C1, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C15); however, they were not intimidated by the technology used to deliver the material, and many enrolled because of the convenience the web-based learning environment afforded them (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15). Four of the learners; however, acknowledged the importance of hands-on training/learning (C5, C7, C10, C14). Technological difficulties were solved by the learners; either in their ability to fix the problem on their own, or by incorporating the help of a family member or someone associated with the farrowing management course (C1, C3, C6, C9, C11, C15). Completers described themselves as high (C2, C3) to average (C1, C4, C5, C7, C8, C10, C11, C12, C13, C14, C15) computer users. Almost all completers had difficulty downloading the videos and there was a common complaint among all concerning the amount of time it took to download the videos as well as the poor quality of the videos (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C12, C13, C14, C15).

The majority of the learners printed off the materials to study and logged back on to the course to complete the quizzes (C1, C2, C4, C5, C6, C8, C13, C14). Two people also expressed the desire to have a notebook with the course material, much like the notebooks used in the Nebraska Extension Home Study Kits prior to placing the course on-line (C3, C9).

Completers displayed a variety of adult learning characteristics found in the literature (Knowles, Holton, & Swanson, 1998). They had a purpose for enrolling in the course. For the majority of the learners, the purpose was to increase their knowledge about farrowing management (C3, C4, C6, C7, C9, C10, C11, C13, C14, C15). Others enrolled in the course in order to use the materials to train their employees on farrowing management techniques (C1, C8). They chose to learn via the Internet because they liked the advantages the web-based learning environment presented – the ability to work on a course at their own pace and on their own time in the convenience of their home or office. Completers also displayed a high degree of self-directedness, another characteristic of adult learners. Distance learning environments tend to be unstructured and require an individual to be in charge of their own learning. Completers developed and maintained a schedule to work on the course and ranked the course middle to high priority on their list of activities/responsibilities.

Completers had the background knowledge and prior experience to be successful in the Farrowing Management Course and the course content was relevant and meaningful to them. They also displayed a high degree of motivation to complete the course. Both issues demonstrated another characteristic of the adult learner.

Non-completers

The audience for the non-completers included a farrowing specialist for a feed company (NC1), a farrowing manager (NC3), experienced producers (NC4, NC5, NC6, NC8), a manager at a nutrition research center (NC7), and novice producers (NC2, NCN1, NCN2, NCN3).

Almost all of the non-completers worked on the course in their home (NC1, NC2, NC3, NC4, NC5, NC6, NC8). They ranked this course as a middle (NC3, NC8) to low (NC1, NC2, NC4, NC5, NC6, NC7) priority and did not keep a schedule to work on the course.

The majority of the non-completers enrolled in the course in order to increase their knowledge in farrowing management (NC1, NC2, NC3, NC5, NC8, NCN1, NCN2, NCN3) and to train others under their supervision (NC4, NC6, NC7). They also enrolled in the course because of the convenience of a web-based learning environment (NC2, NC3, NC6, NC8). They described themselves as average computer users (NC1, NC2, NC3, NC4, NC4, NC5, NC6, NCN2, NCN3) with the exception of one individual, (NCN1). Lack of computer skills did not hinder the completion of the course for all respondents except NCN1. However, almost all of the non-completers cited the lack of scientific or technical content as a reason for not completing the course, claiming that they would not benefit from the instruction; therefore, they chose not to finish the course (NC1, NC3, NC5, NC7, NC8).

Other reasons for not completing the course included too much time allotted to complete the course (NC2, NC4, NC6), failing to submit the quizzes (NC4, NC6, NC8), poor time management (NC2, NC4, NC5, NC6, NC7, NC8, NCN2, NCN3), attitude toward course content (NC1, NC3, NC5, NC7, NC8), and home/work responsibilities (NC2, NC5, NC7, NC8, NCN2, NCN3). A snapshot of the differences and similarities between completers and non-completers follows (Table 2).

Conclusions, Implications and Recommendations

A summary of findings indicated that course designers used instructional design methodologies while creating this course, but targeted the novice producer as the primary audience. They did not take into consideration that advanced producers seeking more scientific or technical content would enroll. Non-completers did not foresee learning anything new from the course, and the lack of advanced course material resulted in many of the non-completers dropping from the course. Completers voiced similar complaints regarding the course content; however, they chose to remain in the course because they set this as a goal and were determined to finish. Two implications exist from these findings: 1) course designers need to create a course or several courses to reach different levels of producers, and 2) completers and non-completers demonstrate a difference in motivation and learning characteristics in regards to finishing the course. Therefore, the researcher recommends conducting a needs assessment in order to determine the level of material producers are seeking and creating lessons to correspond to those learners' specific needs. A second recommendation made by the researcher is to further study the role that persistence or motivation has in course completion. Completers demonstrated a high-degree of motivation in relation to the course, and wanted to finish regardless of their dissatisfaction, while non-completers were uninterested in receiving a certificate when they determined that the course content was not what they were seeking.

Table 2

Differences and Similarities Between Completers and Non-Completers Enrolled in the Farrowing Management WebCT Course

	Completers	Non-Completers Some Lessons	Non-Completers No Lessons
Learner Characteristics	Persistent	Procrastinate	Procrastinate
• Study Process	Print-Outs	Print-Outs/Some Failed Submit Quiz	N/A
• Study Location	Work/Home	Home	N/A
• Course Rank	Middle-High	Middle-Low	Low
Instructional Design	Too Simple – Just Right	Too Simple	N/A
Technological Comfort/Exposure	High-Average	Average Failed to Submit Quiz	Low/Average

Other barriers to completion include too much time (making it easy to procrastinate) or too little time due to multiple responsibilities; both indicate poor time management on the learners' part. The implication exists that an individual still needs structure, even in a self-paced learning environment such as a web-based course. The researcher recommends incorporating weekly chat sessions in order to provide peer interaction and feedback from experts.

Technology was a barrier for only one individual enrolled, resulting in non-completion of the course, but for the rest of the learners, technology was a non-issue. The majority of the learners experienced difficulty downloading the videos and complained about the poor quality of the clips if they were able to view them. Therefore, many of the learners chose not to incorporate the video clips in their learning process. An implication exists that course designers need to improve the quality of the videos as well as decrease the problems associated with download time. The researcher believes that the videos could provide value to the course content and recommends re-digitizing the videos with the new and improved software available today or distributing the videos on CD-ROM.

There were several suggestions made by course designers, completers, and non-completers for improvement to the Farrowing Management Course. The implication exists that the individuals who were involved in the development of the course and enrolled in the course are interested in seeing the course evolve and improve for future enrollees. Based upon their suggestions, the researcher will provide recommendations for course improvement.

Recommendations for Course Improvement

The researcher developed recommendations for the National Pork Producer's Council to help lower the attrition rate for the WebCT Farrowing Management Course. Although these recommendations evolved from findings in this study, the researcher believes that many of these suggestions may be applied to a wider audience and may be considered as best practices when developing/designing and delivering/teaching material for a web-based course.

1) Conduct an on-line needs assessment that would determine the level of material that the learner is seeking and have corresponding lessons created to match the learner's needs.
2) Hyperlink to additional information. This would encourage self-directed learning and allow learners to seek more detailed information.
3) Have a database for the quiz questions that will randomly select the questions each time a learner takes a quiz in order to avoid taking the same one three times.
4) The slow download time and poor quality of the videos created several problems and almost all of the learners chose not to watch them. The researcher believes that the videos could serve as a valuable teaching tool and may offer some of the more detailed and scientific information that the learners are seeking. One solution to the on-line video dilemma would be to place the video clips on a CD-ROM and offer it to the learner for a few additional dollars for those who have the capability to run CD-ROMs on their computer. For those individuals who do not have that capability, the researcher suggests re-digitizing or re-streaming the video clips using the more advanced software available today and incorporating more still images with audio overlay in order to cut down on the choppy appearance of the videos.
5) Add to the Introduction/Welcome page a list of technological capabilities needed in order to utilize everything the course has to offer. Also include a list of qualities for success and expectations when enrolling in a distance education course.
6) In order to obtain more learner interaction and feedback within the web-based environment, have the course designers sponsor weekly chat sessions featuring a topic of the week. This would allow individuals to ask questions and view other participant's queries. A Frequently Asked Questions (FAQ) page could also be added to address questions when not in a chat session.
7) Administer an on-line pre-test for potential students in order to determine if this course is right for them. If they pass the quiz, they should already have a solid understanding of the content in the course and are looking for higher level content.

8) Create several lessons (i.e. more than 10) and allow learners to choose content that is relevant to them. Once the learner has completed 10 lessons, they are awarded a certificate of completion for their custom designed course.

Recommendations for Future Research

This study was exploratory in nature. Because teaching and learning on-line is a relatively new field of study, there was a need to determine learner characteristics and instructional design components that may or may not influence attrition rate. Based upon the results of this investigation, it is recommended that a follow-up study be conducted after implementation of the recommended changes in course design to determine if attrition rate changes.

Persistence or motivation and procrastination are learning characteristics that influence completion (Enckevort et al., 1986; Moore, 1986; Powell et al., 1990; Woodley, 1987). The researcher recommends that further research be conducted in this area utilizing a persistence or motivation instrument such as the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991) in further understanding the role that motivation or persistence plays in course completion.

Final Reflections

The interrelationships among learner characteristics, instructional design, and technological comfort are quite complex. Just like the three legs of a stool provide support and balance, these three factors interplay to provide support to the learner in an asynchronous environment. For example, the course designers must consider prior technological exposure and comfort of the learner when developing a course. Depending on the learner's technological skill set, the course designers may need to provide an opportunity for practice, guided tutorials, or detailed instructions to ensure that technology is not a barrier to course completion. Additionally, course designers can create an atmosphere for peer interaction using communication tools such as chat rooms, threaded discussion, bulletin boards, etc., to simulate the types of discussions that are typical in face-to-face situations. These interrelationships deserve consideration for effective design and delivery of web-based courses.

Even though distance education is providing more convenience and access to continuing education, the learners are still accustomed to the "traditional" classroom environment. Although attrition rate is normally higher in asynchronous situations, it appears that it is more a result of our social norms rather than instructional design issues. With the exception of the simplicity of content, the only difference between completion and non-completion is within the control of the learner and their willingness to be self-directed.

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Identifying and Applying Learning Modes To Risk Management Education to Iowa Farmers

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Abstract

Kolb has identified three main areas of human development related to learning. The last stage relates to adults and how they tend to rely on more than one learning mode. Kolb has identified four learning modes related to adult learning. At the same time, many authors have stressed the need for farmers to have a clear understanding of the risk in farming and how to manage those risks. The purpose of this study was to determine the preferred learning mode of Iowa farmers for risk management education using Kolb's learning modes. Secondary purposes were to gather data on the importance of six sources of risk in farming and the preferred delivery method of farmers in learning how to manage those risks. A descriptive survey research design was used. Data were collected from three groups of farmers through the Iowa Farm Bureau Federation. Data were obtained from 130 farmers using a five-part self-administered questionnaire.

Farmers were asked to rate the importance of six sources of risks in farming using a 5-point Likert-type scale. The results indicated that market/price risk was of greatest importance to them followed by institutional risk and financial risk. The farmers were also asked to indicate their most preferred and least preferred learning mode for each of the six sources of risk using Kolb's learning modes. Abstract conceptualization (learning by thinking/analyzing/using logic) was the most preferred learning mode for all six sources followed by active experimentation (learning by doing and experimenting). More than 60% of all the farmers preferred either of these modes. Eight general classifications of program delivery for risk management education were identified. Over 50% of the respondents indicated that non-formal classes and popular press print media were the most preferred delivery methods for nearly all sources of risk.

In summary, although the results of this study can't be generalized to all Iowa farmers, the results, nevertheless, provide information to agricultural educators about the planning and delivery of risk management education. Consistent with widely accepted learning theories, it appears that farmers prefer to learn about risk and risk management by critical thinking and experimenting with non-formal classes and popular press print media being the most preferred delivery methods.

Introduction/Theoretical Framework

Adult learning is emerging into a new frontier as an increasing number of adults seek additional educational opportunities (Moore & Waldron, 1981). The knowledge explosion has enhanced the need for life-long learning and the demand for people to know more about their home and on-the-job surroundings (Gordon & Souza, 1980). At the same time, many educators believe that adults bring a wide variety of experiences with them to their educational settings according to Slotnick (1993), Smith and Haverkamp (1997), Knowles (1984), and Apps (1988). It is this rich experience base that enhances adult learning.

Kolb (1984) has identified three main areas of human development related to learning. The first stage is from infancy to about age 15, at which time childhood development occurs. The second stage (described as specialization) occurs from age 16 to 40. An individual tends to specialize in that he/she chooses a vocation, a place to live, a field to study and begins to rely more on a particular mode and style of learning. Competence in a particular area is developed. The last stage of the human development process, as described by Kolb, is called integration (age 40 and beyond), whereby an individual feels the need for personal fulfillment. Conflict between the need for specialized competence and personal fulfillment often occurs. An individual in this stage may rely upon more than one learning mode.

Kolb (1984) has identified four learning distinct learning modes that individuals tend to prefer during the specialization and integration stages. His four learning modes are called: concrete experience (learning by feelings/hunches/intuition or specific experiences), reflective observation (learning by observing/watching/listening to others), abstract conceptualization (learning by thinking/analyzing/using logic to solve problems), and active experimentation (learning by doing and experimenting on own).

In agriculture, Klair (1998) states that farmers need to understand the changing need of agriculture at home and abroad and carefully consider how to adapt their businesses to those changes. To be successful in this rapidly changing global economy, farmers, educators, and researchers will need a clear understanding of risk and how to manage it (Harris, Benson, & Rosson, 1998). By managing risk, farmers are better able to stabilize farm income and to ensure that funds will be available to fulfill both business and family-related obligations (Hansen & Pederson, 1998).

Risk and uncertainty is very evident in farming. Many factors, such as weather, crop and livestock diseases, insects, adoption of new technologies, fluctuating prices, and government programs and policies all create a risky situation for farmers. Nelson (1997) defines risk and uncertainty as situations that have many possible outcomes regardless of their desirability. Five common sources of risk found in farming have been identified and widely reported (Hardaker, Brain, Hurine, & Anderson, 1997); Boehlje & Trede, 1977); Baquet, Hambelton, & Jose, 1997; Fleisher, 1990; Kay & Edwards, 1994). The five common sources of risk are: 1) production risk, 2) price or market risk, 3) institutional risk, 4) human or personal risk, and 5) financial risk. Production risk refers to the uncontrollable events in the production of crops or livestock that can result in undesirable outcomes. Examples include weather, crop and livestock diseases, insects, extreme temperatures, and others. Price/market risk reflects the risks associated with fluctuating input and output prices that may occur after the commitment to production begins. Institutional risk results from changes in policies and regulations that affect farming. Examples include changes in government rules regarding the use of pesticides, livestock drugs, disposal of animal waste, land use and conservation, and others. Human/personal risk can result from disruptive changes from such events as death, divorce, injury, or poor health. Lastly, financial risk is impacted by the way the farmer obtains and finances capital. Examples would include fluctuating interest rates, leverage, and cash flow management. For the purposes of this study, production risk was subdivided into crop production risk and livestock production risk, making a total of six different sources of risk in farming.

To mitigate the losses from these sources of risk, farmers must formulate risk management strategies. Risk can not be totally eliminated but through good management practices, it can be reduced. Edwards (private communication, November 4, 1999), therefore, defines risk management [education] as those production, marketing and business management practices that will allow farmers to carry a degree of risk that is consistent with their financial resources and personal preferences.

Many educators have stressed the need for risk management education for farmers. Klair (1998), Nelson (1997), and Pena (1999) concluded that educational programming in risk management should be pursued as a high priority to help farmers assess and plan their future successes. Jose (1998) emphasizes that changes in agriculture pose a major risk for farmers, and those changes create an urgency to develop and deliver educational materials that will meet farmers' needs. Coble and Barnett (1999) stress the need for effective communication of risk management results. Pena (1999), based upon focus group research of Texas and Kansas farmers, concluded that farmers see risk management as a very broad concept. They found that the top three sources of risk were related to revenue (price and yield) and input costs [price/market risk, financial risk, and crop production risk]. Coble, Knight, Patrick, and Baquet (2000) stress the importance of teaching fundamentals of risk management followed by more specific programs.

Purpose/Objectives

The primary purpose of this study was to determine the preferred learning mode of Iowa farmers for risk management education using Kolb's learning mode descriptors. Secondary purposes were to gather data on the importance of the six sources of risk commonly found in Iowa agriculture and to determine the preferred learning mode and delivery method of risk management education to mitigate these sources of risk.

The specific objectives of the study were:

1) To determine the importance of the six sources and sub-topics within each source of risk in farming to Iowa farmers.
2) To determine the most preferred and least preferred learning mode for each of the six sources of risk based upon Kolb's learning modes.
3) To determine the most preferred and least preferred delivery method of risk management education by source of risk

This study is a portion of a larger study dealing with the perceptions of Iowa farmers towards risk management education and the delivery of risk management education (Mickelsen, 2001). Additionally, it is one component of an on-going research project within the Iowa

Agricultural and Home Economics Experiment Station (Project 3374, "Analyzing Delivery Models for Young Adult Farmer Education in Iowa").

Methods/Procedures

This study used a descriptive survey design. This type of research is grounded in the need to "describe and interpret what is" and attempt to "measure what exists without questioning why its exists" (Borg and Gall, 1989). Data from descriptive research can lead to the improvement of education and educational delivery systems (Borg and Gall, 1989).

In order to investigate this topic fully, a random sample of all Iowa farmers should be conducted. However, given the time and financial constraints of this study, a random sample was not feasible. As an alternative, a purposive sampling procedure was used. Ary (1996) states that in purposive sampling (also known as judgment sampling), sample elements judged to be typical or representative are chosen from the population.

The Iowa Farm Bureau Federation provided assistance in identifying three groups that could be used for the study; namely, a sample of Iowa Farm Bureau Federation members who are actively involved in farming, younger farmers attending the Iowa Farm Bureau Young Farmers Conference, and farmers participating in the Iowa Farm Bureau Risk Management Conference. Data were collected from 130 farmers. Farmers from the mail survey were not part of the two conferences.

Based upon the objectives of the study, a survey instrument was developed by the researcher. The questionnaire was divided into six parts. Part 1 was designed to gather data on the importance of various risky events in farming using a 5-point Likert-type scale. Parts 2 and 3 measured the farmers' perceptions toward risk management, risk management tools and strategies, and their attitude and action towards various risk management strategies. Parts 2 and 3 also used a 5-point Likert-type scale. Part 4 had two major purposes; namely, to determine the farmers' preferences towards how they would like to learn about risk and risk management and their most and least preferred delivery methods for risk management education. Kolb's learning modes were used to determine their preference towards how they would like to learn. Part 5 assessed the farmers' risk management profile, while part 6 collected data on the demographic characteristics of the farmers. This paper reports on the findings and conclusions from Parts 1 and 4 from the survey.

A panel of experts consisting of farmers (not included in the study), risk management specialists, agriculture teachers, extension educators, and ISU professors reviewed the instrument to ensure content and face validity. Some minor changes were made as a result of this review. Additionally, Cronbach alpha reliability scores were determined for Parts 1, 2, and 3 of the survey instrument. Reliability scores were .91, .66, and .82 for Parts 1, 2, and 3, respectively.

All data from the three groups were combined into one data set after a review of the demographic data for each individual group. According to M. Shelly, Professor of Statistics/Political Science, this procedure of combining groups into a single data set is an acceptable research methodology when using purposive sampling (Private communication, May 14, 2001).

Results/Findings

Importance of sources of risk in farming. Respondents were asked to rate the importance of several issues within each of the six sources of risk in farming. A five-point Likert-type scale was used ranging from 1=extremely unimportant to 5=extremely important. Grand means for the overall importance of each source of risk were calculated. The results are shown in Table 1.

Market/price risk (mean=4.06) rated the highest in terms of importance for the six sources of risk. It was followed by institutional risk (mean=3.97). Financial risk, human/personal risk, and crop production risk were nearly equally rated in terms of importance as a source of risk by the farmers. Their grand mean scores varied from 3.76 to 3.82.

Within the area of market/price risk, the farmers rated the issue of narrow operating margins, market access for selling products, and the volatility of commodity prices as being the most important. All three individual issues had means of 4.0 or greater indicating that they were very important. In fact, when comparing all of the issues identified and shown in Table 1, these three were among the highest rated in terms of importance.

Changes in government policy/regulations and changes in government farm programs were the two highest rated issues within institutional risk. Both of these issues rated as being very important (mean of 4.0 or greater). They were closely followed by foreign restrictions on farm products and export trade barriers.

Financial risk was the third highest rated source of risk by the respondents (mean = 3.82). Important issues, as rated by the farmers, were having an adequate supply of capital, the recovery time needed from a depressed agricultural economy, and lenders' knowledge of agriculture. Interestingly, the volatility of interest rates was the lowest rated issue within financial risk.

Other major issues identified as being very important to the respondents included death of or injury to an owner/operator (human/personal risk) and weather, wind, hail, etc. (crop production risk). These individual issues were rated as very important with means of greater than 4.0. Several issues related to livestock production were among the lowest rated by the farmers. Demographic data of the respondents revealed that most respondents did not have a livestock program; hence, livestock production risk was of little or no importance to them.

Learning mode and source of farming risk. The farmers were asked to indicate their most preferred and least preferred learning mode for each of the six sources of risk in farming. The learning modes were those identified by Kolb (1984). They are: abstract conceptualization (learning by thinking/analyzing/using logic), active experimentation (learning by doing and experimenting on own), concrete experience (learning by feelings/hunches/intuition or specific

Table 1

Means And Standard Deviations For The Importance Of Sources Of Risk In Farming.

Risk Type	n	Mean	SD
Market/Price Risk			
Narrow operating margins	128	4.33	.691
Accessibility to markets to sell products	129	4.17	.870
Volatility in commodity prices	129	4.14	.751
Global economic conditions	130	3.99	.849
Fluctuating costs of inputs	129	3.94	.794
Trade agreements (NAFTA, etc.)	130	3.73	1.018
Grand Mean		***4.06***	***.575***
Institutional Risk			
Changes in government policy/regulations	130	4.05	.800
Changes in government farm programs	130	4.04	.834
Foreign restrictions on products (GMO, etc.)	128	3.96	1.041
Export trade barriers (tariffs, etc.)	130	3.91	1.368
State/federal environmental regulations	129	3.87	.857
Grand Mean		***3.97***	***.742***
Financial Risk			
Adequate supply of capital	130	4.05	1.051
Recovery time from depressed ag. economy	120	4.04	.943
Lenders' knowledge of agriculture	129	4.01	.935
Business cycles in agriculture	130	3.69	.979
Volatility in interest rates	129	3.64	.998
Grand Mean		***3.82***	***.740***
Human/Personal Risk			
Death of owner/operator	127	4.18	.982
Injury to owner/operator	127	4.08	.909
Lawsuits	128	3.69	1.118
Injury to hired help	128	3.53	1.248
Divorce of owner/operator	128	3.53	1.360
Grand Mean		***3.80***	***.869***
Crop Production Risk			
Weather, wind, hail, etc.	130	4.22	.847
Disease, insects, weeds	129	4.00	.760
Use of new crop varieties	128	3.64	.740
Adoption of new technology/methods	130	3.52	.684
Consolidation of input suppliers	127	3.42	1.043
Grand Mean		***3.76***	***.510***

(table continues)

Risk Type	n	Mean	SD
Livestock Production Risk			
Adequate market outlets for livestock	123	3.68	1.752
Disease	123	3.51	1.729
Initial investment cost of facilities	123	3.29	1.663
Regulations on production practices	122	3.16	1.623
Adoption of new technology/methods	123	2.97	1.496
Obsolescence of facilities	120	2.65	1.553
Grand Mean		***3.19***	***1.53***

Note. 5-point Likert scale. 0=no opinion; 1=extremely unimportant; 2=very unimportant; 3=somewhat important; 4=very important; 5=extremely important

experiences), and reflective observation (learning by observing/watching others and listening. The number of responses and the percentage distribution of those responses are shown in Table 2.

Abstract conceptualization (AC) was the most preferred learning mode for all six sources of risk followed by active experimentation (AE). More than 60% of all farmers preferred either of these learning modes for all sources of risk. In fact, for crop production risk, over 70% of the farmers preferred AC or AE. Two exceptions were noted in that for financial risk and institutional risk, reflective observation (RO) was the second-most preferred rather than AE. Since AC was the most preferred, this would suggest that farmers, regardless of the type of risk, prefer to learn about risk by thinking and analyzing and using logic to solve problems related to risk. Additionally, since AE was the second-most preferred learning mode by the farmers, this would suggest that farmers like to complement their thinking/analyzing/logic with learning by experience and experimenting on their own in order to solve risk management problems rather than using concrete experience (CE) or reflective observation (RO).

Concrete experience (CE) was the least preferred learning mode for all sources of risk. It was followed by reflective observation (RO). Again, one-third or more of the farmers considered concrete experience as their least preferred learning mode, and three-fourths of the respondents considered concrete experience and reflective observation as their least preferred learning mode for all sources of risk. This would indicate a strong preference by the respondents to not learn about risk by learning from their feeling/hunches/intuition or by observing and watching others.

In summary, the data from Table 2 suggest that the respondents prefer to learn about risk by thinking and analyzing or experiential learning and strongly prefer not to learn about risk from their own feelings/hunching and observing and watching others.

Delivery methods for risk management education. Educational providers of risk management education utilize a wide variety of delivery methods and instructional technologies to provide education in risk management. Eight general classifications representing these methods and technologies were identified by the researchers with assistance from the panel of experts. The major classifications identified were: educational print media (EPM), popular press print media

(PPPM), video media (VM), audio media (AM), non-formal classes/meetings (NFC), formal classes (FC), computer assisted instruction (CAI), and distance education (ICN).

Table 2. Most Preferred And Least Preferred Learning Mode By Type Of Farming Risk

Risk Type	Mode*	Most Preferred n	Most Preferred Pct.	Least Preferred n	Least Preferred Pct.
Crop Production Risk	Active conceptualization (AC)	37	37	8	11
	Active experimentation (AE)	34	34	10	13
	Concrete experience (CE)	7	7	35	47
	Reflective observation (RO)22	22	22	29	
Livestock Production Risk	Active conceptualization (AC)	37	42	4	4
	Active experimentation (AE)	23	26	10	16
	Concrete experience (CE)	10	11	32	49
	Reflective observation (RO)19	21	20	31	
Market/Price Risk	Active conceptualization (AC)	34	34	8	11
	Active experimentation (AE)	29	29	13	18
	Concrete experience (CE)	16	16	32	44
	Reflective observation (RO)21	21	20	27	
Institutional Risk	Active conceptualization (AC)	33	38	6	10
	Active experimentation (AE)	19	22	13	21
	Concrete experience (CE)	12	14	28	45
	Reflective observation (RO)23	26	15	24	
Human/Personal Risk	Active conceptualization (AC)	42	44	6	9
	Active experimentation (AE)	19	20	13	19
	Concrete experience (CE)	18	19	27	39
	Reflective observation (RO)16	17	23	33	
Financial Risk	Active conceptualization (AC)	47	49	8	11
	Active experimentation (AE)	17	17	12	16
	Concrete experience (CE) 11	11	31	43	
	Reflective observation (RO)22	23	22	30	

*AC (active conceptualization): learning by thinking/analyzing/using logic
AE (active experimentation): learning by doing and experimenting on own
CE (concrete experience): learning by feelings/hunches/intuition or specific experiences
RO (reflective observation): learning by observing/watching others and listening

Respondents were asked to indicate their most preferred and least preferred method or technology for learning about each of the sources of risk. The results are shown in Table 3. Data are presented for each delivery method within each source of risk.

Very few differences were noted regarding the most preferred delivery method for all six major sources of risk. Non-formal classes rated the highest for all sources of risk except for human/personal risk. In that case, popular press print media rated the highest. Popular press print media rated second for the other five sources of risk.

Table 3. Most Preferred And Least Preferred Delivery Method Of Risk Management Education By Type Of Farming Risk.

Risk Type	Method*	Most Preferred n	Most Preferred Pct.	Least Preferred n	Least Preferred Pct.
Crop Production Risk	EPM	13	16	4	5
	PPPM	25	31	4	5
	VM	3	4	6	8
	AM	0	0	17	22
	NFC	30	36	3	4
	FC	3	4	15	20
	CAI	6	7	18	24
	ICN	2	2	9	12
Livestock Production Risk	EPM	12	16	2	3
	PPPM	21	28	5	7
	VM	2	3	8	12
	AM	0	0	14	20
	NFC	27	37	1	1
	FC	2	3	13	19
	CAI	9	12	15	22
	ICN	1	1	10	14
Market/Price Risk	EPM	7	9	4	5
	PPPM	22	27	7	9
	VM	5	6	6	8
	AM	0	0	18	24
	NFC	29	35	1	1
	FC	5	6	9	12
	CAI	12	15	15	20
	ICN	2	2	15	20
Institutional Risk	EPM	18	24	4	6
	PPPM	16	21	6	9
	VM	3	4	9	13
	AM	2	3	10	14
	NFC	24	32	2	3
	FC	4	5	13	19
	CAI	6	8	12	17
	ICN	2	3	13	19

Human/Personal Risk	EPM	15	19	2	3
	PPPM	24	30	7	10
	VM	7	9	5	7
	AM	3	4	15	21
	NFC	21	26	3	4
	FC	4	5	12	16
	CAI	4	5	17	23
	ICN	2	2	12	23
Financial Risk	EPM	14	18	3	3
	PPPM	23	29	5	7
	VM	3	4	9	12
	AM	0	0	13	18
	NFC	22	18	2	3
	FC	10	13	11	15
	CAI	6	8	16	22
	ICN	1	1	15	20

Note.
EPM = educational print media (extension bulletins, fact sheets, study packets, university newsletters)
PPPM = popular press print media (farm magazines; trade publications, newspapers)
VM = video media (video tapes, television, slide presentations, satellite dish/direct TV)
AM = audio media (cassette tapes, radio programs)
NFC = non-formal classes/meetings, (extension meetings, trade seminars, adult field days)
FC = formal classes (university and community college credit courses/seminars)
CAI = computer assisted instruction (Internet, WWW, CD ROM, information services)
ICN = distance education (Iowa Communications Network)

Combining the top two responses for the most preferred delivery method shows that for all sources of risk, either non-formal classes or popular press media were the most preferred expect for institutional risk. In that situation, educational print media rated second. It should be noted that over 60% the respondents preferred non-formal classes or popular press print media for learning about crop production, livestock production, and market/price risk.

The respondents were slightly more varied in their responses regarding their least preferred method of delivery. Computer-assisted instruction was the least preferred method of delivery for crop production, livestock production, human/personal, and financial risk. Distance education and formal classes were least preferred methods for institutional risk while audio media was least preferred for market/price risk.

The responses were combined to show the three least preferred delivery methods. Audio media, formal classes, and computer assisted instruction were least preferred for production risk (68% of the total) and livestock production risk (61% of the total). Sixty-four percent of the respondents indicated that audio media, computer-assisted instruction, and distance education were the least preferred methods for market/price risk. This compared to 60% of the total for financial risk. For institutional risk, the three least preferred methods were formal classes, computer-assisted instruction, and distance education (55% of the total) compared to audio media, formal classes, compute assisted instruction, and distance education (73% of the total) for human/personal risk.

In summary, non-formal classes and popular press print media were generally the most preferred delivery methods. Audio media, formal classes, computer assisted instruction, and distance education were generally the least preferred delivery methods.

Conclusions/Recommendations/Implications

Several conclusions and recommendations can be made from the results of this study. Implications to agricultural educators are noted wherever appropriate.

1. The farmers in this study generally agreed that all sources of risk were somewhat important to very important. Market/price risk rated the highest (mean=4.06) and livestock production risk the lowest (mean=3.19) . For agricultural educators, this would indicate the importance of risk management education as an educational priority program.
2. When asked to indicate their most preferred learning mode (based upon Kolb's descriptors) for each type of risk, active conceptualization and active experimentation were the two most preferred except for financial risk. More than 60% of the farmers preferred either AC or AE for all sources of risk. This would suggest that agricultural educators design teaching/learning activities that emphasize problem-solving and critical thinking when planning risk management education programs. Coupling these types of teaching/learning activities with learning by experience and self-experimentation would be highly effective in terms of learning mode preferences by these farmers.
3. Concrete experience (CE) or learning by feelings/hunches/intuition appears to be the least preferred learning mode by nearly 50% of the respondents for all types of risk.
4. Very few differences were noted regarding the most preferred delivery method for all six types of risk. Non-formal classes rated the highest for all types of risk except for human/personal risk. In that case, popular press print media rated the highest. Popular press print media rated second for the other five types of risk. These preference indicate that farmers prefer non-formal classes to learn about risk. Examples would include extension meetings and conferences, agri-business sponsored meetings, trade seminars, workshops at field days, etc. Since popular press print media was also highly rated, then educational providers should consider news releases, farm magazines, newspapers, and trade publications when providing education on risk management.
5. The respondents were slightly more varied in their responses regarding their least preferred delivery method. Computer-assisted instruction, distance education, and

formal class (credit courses) were the least preferred. These results indicate a need for additional research and education of farmers on cutting-edge instructional technologies, particularly distance education.

6. Combining the most preferred learning mode with the most preferred delivery method would indicate that these farmers would show a preference for non-formal classes that emphasize problem-solving and critical thinking/analysis when learning about risk management. In turn, they would prefer to combine these with their own experiential learning and experimentation. Therefore, agricultural educators should consider these learning mode/delivery method combinations when planning risk management education programs.
7. This study supports the Kolb concept that persons in the specialization or integration stages of learning tend to prefer more than one learning mode. The fact that more than 60% of all the farmers preferred either abstract conceptualization or active experimentation for learning about all sources of risk tends to support Kolb's theory.
8. This study supports the findings of Pena (1999) in terms of the importance of the sources of risk. Additionally, it confirms the findings of Coble (2000) regarding teaching strategies for risk management education.
9. While these results may not be generalized to the entire population of Iowa farmers, they, nevertheless, are indicative of preferred learning modes and delivery methods for risk management education. This study should be replicated to more fully discern effective teaching/learning and delivery models for this important topic for farmers.

In conclusion, many agricultural educators have advocated the importance of risk management education for farmers. This study has added to the body of knowledge regarding the most effective teaching/learning activities and delivery of that education based upon established and well-recognized learning theories.

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Philosophies of Adult Education as Practiced by Agricultural Education Teachers

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Abstract

The purpose of this study was to increase understanding of adult education philosophies as practiced by Pennsylvania, West Virginia, and Virginia secondary school agricultural education teachers. A Philosophy of Adult Education Inventory (PAEI), developed by Lorraine M. Zinn, and a researcher-created demographic sheet was sent to a sample of agricultural education teachers in the tri-state area. One hundred and eighteen secondary agricultural education teachers responded to the survey (38%). The average respondent was male, 44 years of age, had 18 years teaching experience, and had taught adult education classes for 14 years. Approximately 50% had formal training in teaching adults and two-thirds were paid to teach adult classes in agriculture.

Slightly more than two-thirds of the educators in the tri-state area identified with the Progressive philosophy. This philosophy of adult education is concerned with the well-being of society and an individual's role in society. Analysis of variance statistical procedures were used to distinguish differences between the means of the five philosophical groups and key demographic variables used in the study. When the five philosophical group means were compared by state, a statistically significant variance was determined between the Humanistic Philosophy and the state variable. Further analysis showed a statistical difference between the mean score of Pennsylvania and West Virginia.

Introduction

Over the past one hundred and twenty-five years, agricultural education has been a pioneer in the development of adult education. This effort was enhanced with the passage of four major pieces of Federal legislation. The Morrill Act of 1862 established the Land-Grant Colleges. Their emphasis on education in agriculture and the mechanical arts was designed to improve social and economic conditions for the rural population. In 1887, the Hatch Act established the Agricultural Experiment Stations. By making it possible to apply scientific findings to real world agricultural problems, the Hatch Act increased the need for adult education in agriculture. The Smith-Lever Act of 1914, which established the Cooperative Extension Service, and the Smith-Hughes Act of 1917, which established vocational education in agriculture in the public schools, provided a specific response to the need for adult education in agriculture (Bender, McCormick, Woodin, Cunningham, & Wolf, 1972).

While agricultural education was a pioneer in the development of adult education programs, the number of secondary agricultural education programs offering an adult component has declined in recent years. In 1989, Birkenholz and Marcie (1991) found that while there were 5,852 secondary agricultural education programs in the United States, there were only 1,610 adult agricultural education programs. In 2000, Burdette (unpublished manuscript) found less than one fourth of the agricultural educators in West Virginia (22.7%) were conducting organized educational activities for adults outside of the normal school day.

Adult agricultural education programs are more important today than ever before because of rapid advances in technology, innovative marketing, new farm management techniques, new agricultural laws, and regulations (Chizari & Taylor, 1991). A study by Lilley, et al., (as cited in Chizari & Taylor, 1991) suggests that adults in production agriculture need classes on feeds, crop production, soil sciences, farm records and management, farm mechanics, long range planning, government laws, and regulations. Drueckhammer and White (1984) suggested that because of the declining numbers in agricultural producers, the need for production information has decreased also. Harbstreit (as cited in Birkenholz & Maricle, 1991) stated that adult agricultural education programs used to focus on improving the efficiency in production agriculture and managerial skills, now the focus has shifted to problems of agricultural consumers, homeowners, gardeners, and concerned citizens. Nur, Birkenholz, and Stewart (1989) agreed that a shift in the target audience and the knowledge base for adult education programs has occurred.

- An important factor in an adult educator's purposes, methodology, and teaching processes is their philosophy of education (Wingenbach, 1996). Philosophies of adult education are the beliefs about the way in which adult education should be conducted and the general principles that guide practice (Beder, 1989). Therefore, developing a working philosophy of adult education is important to adult educators when planning programs.

Many leaders in adult education have developed principles to help educators form a working philosophy. Apps (1981) suggested the following guidelines, consisting of four phases, to develop one's own adult education philosophy.

- Identify beliefs about adult education by asking oneself questions about the learner, the overall purpose of adult education, content or subject matter, and the learning process.
- Search for contradictions in the beliefs.
- Discover where the basis for these beliefs came from and find supporting beliefs.
- Make judgments about the beliefs held.

Another leader in adult education, Beder (1989), formed principles that are not as lengthy and could be used to build a foundation of philosophy in adult education. The five principles are:

1. Whether society is basically good or is inherently flawed, it can and should be improved. In this, adult education can and should play a major role.
2. If individuals and ultimately societies are to prosper, learning must continue throughout life.

3. Adults are capable of learning and should be treated with dignity and respect.
4. All adults should have access to learning the things required for basic functioning in society.
5. Although adults may or may not differ from pre-adults regarding the basic cognitive processes of learning, the context of adult education differs substantially from the context of pre-adulthood. Hence, adults should be educated differently from pre-adults.

Zinn (1983) designed the Philosophy of Adult Education Inventory (PAEI), based on five philosophical tenets, as practiced by adult educators. The following provides an in-depth description of these philosophical ideologies.

Liberal: This adult philosophy purpose is to develop intellectual powers. Liberals always seek knowledge. They work to transmit knowledge and clearly direct learning. The educator is the "expert". He/she directs the learning process with complete authority. Learning methods used include lecture, study groups, and discussion. Socrates, Plato, and Piaget were practitioners of the liberal philosophy. (Note: Liberal adult education does not refer to liberal political views, it is related to Liberal Arts.)

Behaviorist: The purpose of the Behaviorist adult philosophy is to promote behavioral change to guarantee that societies standards and expectations are upheld. Environmental influence is strong in this philosophy. The traits of the behaviorist teacher are close to those of the liberal. The behaviorist "manages" the learning process and directs learning. Behaviorist concepts include mastery learning and standards-based. Some methods of teaching that behaviorist educators use include programmed instruction, contract learning, and computer guided instruction. Vocational training and teacher certifications are both behaviorist practices. Skinner, Thorndike, and Steinberg all believe in the behaviorist philosophical tenet.

Progressive: This philosophy of adult education is concerned with the well-being of society and an individual's role in society. Learners of this philosophy need problem solving skills and practical knowledge. Teaching methods used in this philosophy include problem solving, scientific method, and cooperative learning. The educator is an organizer who guides learning instead of directing learning and also evaluates the learning process. Progressive proponents include Spencer, Dewey, and Lindeman.

Humanistic: The humanistic philosophy seeks to facilitate personal growth and development. Humanists are highly motivated and self-directed learners; responsibility to learn is assumed by the learner. The humanist educator facilitates learning but does not direct learning. The educator and learner are "partners." Concepts that define the humanistic philosophy include experiential learning, individuality, self-directed, and self-actualization. Humanistic teaching methods contain group discussion, team teaching, individualized learning, and the discovery method. Rogers, Maslow, Knowles, and McKenzie are facilitators of the humanistic philosophy.

Radical: The Radical adult education philosophy or Reconstructionist philosophy promotes social, political, and economic change through education. The educator and learner are equal partners in the learning process. The educator is the coordinator of the class and makes suggestions but does not direct the learning process. This philosophy embraces concepts such as noncompulsory learning and deschooling. Exposure to the media and people in real life situations are considered effective teaching methods. Holt, Freire, and Illich are proponents of the Radical adult education philosophy.

Studies Dealing with Philosophies of Adult Educators

In a study of students enrolled in the researcher's classes, Wingenbach (1996) found significant differences between gender and the Behaviorist and Radical orientations. All females were found to have higher mean scores than males in the Radical philosophical orientation. As noted by Zinn (1990), "Radical [Reconstructionist] adult education also runs against the current of American value patterns" (p. 56). In the Behaviorist orientation, female graduates had higher mean scores than did male graduates, except in the undergraduate group. In this group the males had higher mean scores. The students did not differ statistically in their mean scores for the Behaviorist, Humanistic, or Radical orientations.

These findings differ from the findings of McKenzie (1985). In his study, McKenzie (1985) found significant differences in all five philosophical orientations while comparing business trainers, religious educators, and adult education graduate students (p. 20). Due to the significant differences in Liberal and Progressive orientations between these groups of students certain assumptions about these orientations were apparent in both groups' thinking, while completing the PAEI inventory. Some assumptions might be: (a) the group of graduate students scored higher in the Progressive orientation because of their teaching experience (about 12 years), which has given them an advantage in teaching practical skills like problem solving; and (b) the group of undergraduates scored higher in the Liberal orientation because of their lack of experience, which has not allowed them an opportunity to apply theoretical knowledge outside the university.

Despite the differences in age and years of experience between the two groups in this study, these students can identify, clarify, and reflect upon their educational beliefs and values. The significant differences between the groups in the Liberal orientation may represent the findings of Berger and Luckmann (1966). That is, when individuals enter an existing institution, they begin to express the views reflected in that institution; they begin to speak a common language. In time, once the undergraduate students have gained experience, they may want to repeat the PAEI to check for shifts in their philosophical orientations.

The relationship between identifying a specific adult education philosophy and agricultural education should be an important educational factor for secondary school agricultural educators. Youth and adults differ greatly in their preferred learning styles and educational environments. If agricultural education teachers can accept these basic differences, then the teaching methods, procedures, activities, learning environments, and evaluations must differ also for adult audiences. There remains the question of whether actual differences do exist when secondary agricultural education teachers teach adults? Previous research shows that significant differences do exist between educators when compared by years of experience and/or gender (Wingenbach, 1996; Zinn, 1990) and educational level (McKenzie, 1985). The researcher is left to ponder, does a methodological difference in agricultural programming exist for adult and pre-adult participants in Pennsylvania, West Virginia, and Virginia? Do agricultural education teachers from Pennsylvania practice a significantly different adult educational philosophy than teachers from Virginia or West Virginia?

Purpose and Objectives

The purpose of this study was to increase the understanding of adult education philosophies as practiced by Pennsylvania, West Virginia, and Virginia secondary school agricultural education teachers. Specific objectives were to:

1. Determine the demographics of Pennsylvania, West Virginia, and Virginia agricultural education teachers who may have taught an adult technology class in agriculture during 1998-99.

2. Assess Pennsylvania, West Virginia, and Virginia agricultural education teachers' philosophies of adult education using the Philosophy of Adult Education Inventory.

3. Determine if significant relationships exist between agricultural education teachers' philosophies and selected demographic variables.

Limitations of the Study

The study was limited to secondary school agricultural education teachers (N=657) in Pennsylvania, West Virginia, and Virginia who may have taught adults in their local communities during the 1998-99 academic year. The PAEI may not accurately represent all adult education philosophies through its listing of questions and responses.

Methods and Procedures

Population and Sample

The target population of this study included all agricultural education teachers from Pennsylvania (N=259), West Virginia (N=95), and Virginia (N=303) who taught classes during the 1998-99 academic year and who were listed in their respective state's Agricultural Educators Directory for the 1998-99 academic year. The researcher obtained original copies (paper and electronic) of these directories from the State Supervisor for Agricultural Education. From these rosters, the population of agricultural education teachers was determined to be 657. Proportional stratified sampling was employed to ensure equal representation from each state identified in the target population. A sample size of 314 was needed to represent this population (Krejcie & Morgan, 1970).

Instrumentation

The Philosophy of Adult Education Inventory (PAEI) was used to obtain information for this study. The PAEI was developed by Lorraine M. Zinn to help the adult educator determine his or her philosophy of education and compare it to other educators' philosophies. The PAEI consisted of 75 statements rated on a seven-point Likert-type scale with 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. Total scores can range from 15 to 105 for each of the philosophical orientations. These scores signify the individuals' views toward the five philosophies of adult education.

The educators' highest score is the score that most closely describes their philosophy. The lowest score is the philosophy least like the educators' philosophy. A score of 95 to 105 indicates that the educator strongly agrees with a philosophy. A score of 15-25 indicates that the educator strongly disagrees with a philosophy. Most educators have one philosophy that receives a high score, therefore, that is the philosophy that the educator agrees with and uses when teaching. It is not uncommon, however, for an educator to have two philosophies that have high scores. This occurs because of some overlap in the philosophies. Educators who have other combinations of high scores or have three or more close scores should review their beliefs and look for contradictions (Zinn, 1983). Some common philosophy combinations are Liberal and Behaviorist, Progressive and Humanistic, Progressive and Radical, and Humanistic and Radical (Zinn, 1983).

In previously published studies by Zinn (1987), the PAEI had been determined to be a reliable and valid instrument for measuring adult education philosophies with reported Cronbach's alpha levels at 0.75. The PAEI was designed to be administered, scored, and interpreted by the respondent (Zinn, 1983). The instructions sent with Zinn's inventory were the original instructions Zinn developed to accompany the PAEI. An additional instrument, developed by the researcher, was sent to assess respondents' educational degree attained, years of teaching experience, geographic location, age and gender.

Data Collection Procedure

Data collection procedures were developed based upon practices recommended by Dillman (1978). The data collection efforts began on May 7, 1999. For the study, the PAEI instrument, demographic questionnaire, cover letter, and self-addressed, stamped return envelopes were mailed to the sample group in Pennsylvania, West Virginia, and Virginia. Two weeks after the initial mailing, follow-up postcards were sent out to all non-respondents. This card reminded the respondent that they had received the PAEI and a questionnaire and that their response was important to the study. Four weeks after the first mailing, a second postcard reminder was sent to all non-respondents.

Five weeks after the initial mailing, the researcher selected 10% of the non-respondents and sent them a new PAEI, cover letter, and demographic sheet. The mean responses of these subjects were statistically compared to the respondents to determine if significant differences existed (Ary, Jacobs, & Razavieh, 1996). Data collection ended July 23, 1999.

Analysis of Data

Data collected were analyzed using the Statistical Package for Social Sciences for Windows (SPSS). Descriptive statistics such as frequencies, means, and standard deviations, as well as correlational and multivariate analyses were used to describe and analyze the research results.

Results/Findings

Adult Educators

The sample size for the study was 314 teachers comprised of 93 adult educators and 221 non-adult educators. A total of 118 surveys returned were usable in this study resulting in a response rate of 38%. When the response rate was examined by dividing the respondents into adult educators and non-adult educators, there was a significant difference in the rates. For example, 75 of the 93 adult educators returned their survey for a response rate of 81%. Of the non-adult educators only 43 of the 221 educators returned their surveys resulting in a response rate of 19%.

Non-Response Error

An Analysis of Variance (ANOVA) was used to determine if differences existed between respondents and non-respondents. Non-respondents were surveyed using the double-dipped sampling method. No significant differences were found between the two groups when dealing with philosophies, therefore, generalizations could be made to the entire population.

Demographics of Respondents

Each respondent provided basic demographic information in addition to completing the PAEI instrument. Respondents were asked questions including state, age, gender, degree, years of teaching secondary school, number of years teaching adults, whether the educator received formal education for teaching adults, and whether the educator received monetary compensation.

The average age of the respondents was 44 years ranging from a low of 22 years old to a high of 63 years of age. The minimum number of years taught by the respondents was less than one year and the maximum was 35 years. The average number of years taught by the respondents was 19 years. The minimum number of years teaching adults was one year while the maximum number of years teaching adults was 34 years. The average number of years that educators had taught adults was 14 years.

Of the 118 respondents, 75 were adult educators (63.6%). Respondents included 49 educators from Pennsylvania (41.5%), 45 educators from Virginia (38.1%), and 24 educators from West Virginia (20.3%). Ninety-nine respondents were male (83.9%). Sixty-one respondents (54.0%) had an advanced college degree (Masters Degree or Ph.D.) while 52 respondents (46.0%) had a Bachelor's Degree. Eighty-eight respondents indicated they taught adults (77.2%). Sixty-two respondents (56.4%) reported having receiving formal training in teaching adults and 69 respondents (64.5%) were paid to teach adult classes.

Philosophy of Adult Education

Eighty educators in the tri-state area (67.8%) identified with the Progressive philosophy. None of the respondents identified with the Liberal philosophy. Other philosophies represented by the respondents included 25 Behaviorists (21.2%), 9 Humanists (7.6%), and 4 Radicals (3.4%). Pennsylvania educators had the highest percentage in the Progressive group (71.4%), followed by Virginia (68.9%), and West Virginia (58.3%). West Virginia has the highest Behaviorist rate (29.2%), followed by Pennsylvania (20.4%), and Virginia (17.8%). West Virginia had the highest rate of Humanist philosophies followed by Virginia and Pennsylvania. Those rates were 12.5%, 8.9%, and 4.1%, respectively. Pennsylvania and Virginia each had two Radical respondents (see Table 2).

Table 1

Descriptive Statistics for Demographic Data

Variable	f	P
State (n = 118)		
Pennsylvania	49	41.5%
Virginia	45	38.1%
West Virginia	24	20.3%
Gender (n = 107)		
Male	99	83.9%
Female	19	16.1%
Degree (n = 118)		
Masters	60	53.1%
Bachelors	52	46.0%
Ph.D.	1	0.9%
Teach Adults (n = 114)		
Yes	88	77.2%
No	26	22.8%
Adult Education Preparation (n = 110)		
Yes	62	56.4%
No	48	43.6%
Adult Education Payments (n = 107)		
Yes	69	64.5%
No	38	35.5%

Correlation between Philosophies and Demographic Variables

Correlational relationships between the five philosophical categories and the selected demographic variables were examined. The Davis Convention (Davis, 1971) was used to measure the level of association between variables.

Researchers found a strong association between the Liberal and Behaviorist philosophies (.81). There was also a strong association between the Behaviorist and Progressive philosophies

(.72). There was a substantial association between the Liberal and Progressive philosophies (.59) as well as the Humanistic and Progressive philosophies (.55) (see Table 3).

Table 2

Philosophical Totals by State

	Pennsylvania		West Virginia		Virginia		Total	
	N	P	N	P	N	P	N	P
Liberal	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Behaviorist	10	20.4%	8	17.8%	7	29.2%	25	21.2%
Progressive	35	71.4%	31	68.9%	14	58.3%	80	67.8%
Humanist	2	4.1%	4	8.9%	3	12.5%	9	7.6%
Radical	2	4.1%	2	4.4%	0	0.0%	4	3.4%
Total	49	100.0%	45	100.0%	24	100.0%	118	100.0%

Table 3

Correlation Between Philosophical Categories and Demographic Variables

	Liberal	Behaviorist	Progressive	Humanist	Radical
Liberal		.81**	.59**	.38**	.29**
Behaviorist			.72**	.42**	.30**
Progressive				.55**	.26**
Humanist					.48**
Radical					
Age	.11	.05	.01	.00	.11
Years	.17	.17	.06	-.03	.04
Adult Years	.15	.09	-.04	-.01	.13
State	.00	-.02	.09	-.27**	-.08
Gender	.06	-.05	.13	-.02	.10
Degree	.07	.10	.10	.01	.07
AE Preparation	.07	.14	.05	.17	.13
AE Payment	.10	.09	.19*	.07	-.04

* p<.05
** p<.05

The Liberal philosophy has a statistically significant correlation (< .01) with the Behaviorist, Progressive, Humanistic, and Radical philosophies. The Behaviorist philosophy correlated significantly (< .01) with the Progressive, Humanistic, and Radical philosophies. The Progressive philosophy was significantly correlated (< .01) with the Humanistic and Radical Philosophies, and the Humanistic philosophy was significantly correlated (< .01) with the Radical philosophy (see Table 3).

Correlation between the philosophies and the demographic variables were also examined. There was a statistical difference (< .01) between the State variable and the Humanistic philosophy (-.27), as well as, a statistical significant difference (< .05) for the Adult Education Payment variable and the Progressive philosophy (.19). Both of these correlations show low associations according to the Davis convention.

Summary, Conclusions, and Implications

One hundred and eighteen secondary agricultural education teachers in Pennsylvania, West Virginia, and Virginia responded to the survey with useable data for a 38% response rate. This included 49 educators from Pennsylvania, 45 from Virginia, and 24 from West Virginia. The average respondent was 44 years of age, had 18 years teaching experience, and had taught adult education classes for 14 years. Approximately two-thirds of the respondents taught adults. The group was predominately male with more than half having an advanced degree. Approximately 50% had formal training in teaching adults and two-thirds were paid to teach adult classes in agriculture.

Slightly more than two-thirds of the educators in the tri-state area identified with the Progressive philosophy. None of the respondents identified with the Liberal philosophy. Other philosophies represented by the respondents included Behaviorists (21.2%), Humanists (7.6%), and four Radicals (3.4%). Pennsylvania educators had the highest the highest percentage in the Progressive group (71.4%), followed by Virginia (68.9%), and West Virginia (58.3%). West Virginia has the highest Behaviorist rate (29.2%), followed by Pennsylvania (20.4%), and Virginia (17.8%). West Virginia had the highest rate of Humanist philosophies followed by Virginia and Pennsylvania. Those rates were 12.5%, 8.9%, and 4.1%, respectively. Pennsylvania and Virginia each had two Radical respondents.

Correlational relationships between the five philosophical categories and the selected demographic variables were examined. Researchers found a strong association between the Liberal and Behaviorist philosophies. There was also a strong association between the Behaviorist and Progressive philosophies. There was a substantial association between the Liberal and Progressive philosophies as well as the Humanistic and Progressive philosophies.

Correlation between the philosophies and the demographic variables were also examined. There was a statistical difference between the State variable and the Humanistic philosophy as well as, a statistical significant difference for the Adult Education Payment variable and the Progressive philosophy.

Implications

After examining the results from this study, it leaves one with the age-old adage, "which came first, the chicken or the egg?" In other words, were the philosophies of the agricultural educators influenced by teaching methods learned in their teacher preparation program or was the selection of educational methods used with adults a result of their philosophical development?

Slightly more than two-thirds of the educators in the tri-state identified with the Progressive philosophy. Keep in mind that teaching methods used in this philosophy include problem solving, scientific method, and cooperative learning. Agricultural educators have long been advocates of the problem solving approach to teaching. Over the past one hundred years, Dewey's Steps in Reflective Thinking, also known as The Chain of Reasoning, The Method of Science, and The Scientific Method, have been recommended by agricultural educators as the problem solving approach to teaching (Binkley and Tulloch, 1981; Crunkilton and Krebs, 1982; Hammonds, 1950; Krebs, 1967; Lancelot, 1944; Newcomb, McCracken, and Warmbrod, 1993; Stewart, 1950).

Has the emphasis on the use of problem solving in teaching high school and adults agricultural education students influenced the philosophical development of agricultural educators? While the data from the study did not lend itself to answering this question, it presents an interesting topic for additional research.

An additional twenty-one percent of the population identified with the Behaviorist philosophy. Once again, the Behaviorist educators utilize programmed instruction, contract learning, and computer guided instruction. Vocational training and teacher certifications are both examples of behaviorist practices. Has the influence of vocational training and teacher certification programs impacted the philosophy of these individuals?

If philosophical development is influenced by undergraduate and graduate education, teacher educators have an excellent opportunity to have a positive influence on potential adult educators. It has long been accepted that life-long learning occurs in the form of problem solving (Newcomb, McCracken, & Warmbrod, 1993). If teachers are prepared to use proven methods of teaching such as problem solving, it will enhance the quality of their adult programs as well as the level of learning of their adult students. Additional research is needed on the factors that affect the development of adult educator philosophies.

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Testing the Underlying Motives of Organizational Citizenship Behaviors: A Field Study of Agricultural Co-Op Workers

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Abstract

This study tests the relationship between sources of motivation and organizational citizenship behaviors. One hundred seventy-five employees from 31 locations of two agriculturally based companies completed the motivation sources inventory (Barbuto & Scholl, 1998) and were rated by their supervisors for demonstrated organizational citizenship behaviors (Organ, 1997; Smith, Organ & Near, 1983). Results showed significant relationships between instrumental, self-concept external, and self-concept internal motivation and organizational citizenship behaviors. Implications of these findings for research and practice, and suggestions for future research are discussed.

Introduction

Research of organizational citizenship behaviors has been extensive since its introduction close to twenty years ago (Bateman & Organ, 1983). The vast majority of organizational citizenship behavior (OCB) research since has focused on the effects of OCBs on individual and organizational performance. There is consensus in the field that organizational citizenship behaviors are salient behaviors for organizational enterprises. However, the antecedents of organizational citizenship behaviors are not well established. Organ (1997) called for a greater attention in research foci on the predictors of OCBs, noting that employee motives may offer an empirical explanation of the phenomena. At the time, there were no strong measures of employees' sources of motivation. Barbuto and Scholl (1998; 1999) developed an instrument to measure employees' work motivation and used it to predict leaders' behaviors. Subsequent work also has demonstrated the strong predictive value of the Motivation Sources Inventory (Barbuto, Fritz, & Marx, 2000). This study seeks to explore the relationships between employees' sources of motivation and their organizational citizenship behaviors.

Antecedents of OCB

Organizational Citizenship Behavior (OCB) was introduced by Smith, Organ and Near, (1983), which defined OCB as discretionary individual behavior, not directly or explicitly recognized by the formal reward system, which, in the aggregate, promotes the effective functioning of the organization. This concept is similar to Katz and Kahn's (1978) description of extra-role behaviors and Barbuto's (2000) influence resistance zone behaviors.

Smith, et al. (1983) and Bateman and Organ (1983) conducted the first research on the antecedents of Organizational Citizenship Behavior, finding job satisfaction to be the best predictor. After 17 years of research, job satisfaction is still the leading predictor of OCB (Organ & Ryan, 1995). This is problematic because, descriptively, job satisfaction is in and of itself a challenging outcome sought by organizational managers. The resulting implications are restricted to suffice that OCB is likely when workers are satisfied. There are just as many questions regarding the antecedents of job satisfaction as there are questions about the antecedents of organizational citizenship behaviors. Many scholars believe job satisfaction is too broad a construct for the accurate prediction of OCB (Deluga, 1994; 1995; Penner, Midili & Kegelmeyer, 1997).

The search for other reliable predictors of organizational citizenship behaviors has been increasing during the past ten years, during which time researchers have used, with varying degrees of predictive merit: personality (Organ, 1990; Organ, 1994; Organ & Lingl, 1995; Penner, et al., 1997), procedural justice (Moorman, 1993; Aquino, 1995; Skarlicki & Latham, 1996; Farh, Earley, & Lin, 1997; Schappe, 1998), leadership characteristics (Deluga, 1994; 1995; Podsakoff, Mackenzie, & Bommer, 1996), motivational theories (Kemery, Bedeian, & Zacur, 1996; Tang & Ibrahim, 1998), and interview styles (Latham & Skarlicki, 1995). Most of these studies provided more questions than answers, with low correlations and little variance accounted for in the data. Organ (1990) proposed that an employee's individual dispositions would provide the most valuable explanation of organizational citizenship behaviors to researchers and practicing managers.

Organ (1994), after using McCrae and Costa's (1987) Big Five personality test in an unsuccessful attempt at predicting OCB, concluded, "the possible limitation with measures based on the Big Five is that they have more to do with temperament than motives" (p. 475). Recent research using motivation to measure an individual's disposition has renewed interest in examining Organ's (1990) model proposing that an individual's motives may relate to his or her organizational citizenship behaviors (Kemery, et al., 1996; Tang & Ibrahim, 1998).

Penner, et al. (1997) explored the impact of personality and motivation on OCB. Since no previous research had used motivation to predict OCB, they developed their propositions from the volunteerism research. They proposed that several types of motivation cited in volunteerism research are related to OCB: value expressiveness (Goal internalization), social adjustment (Self-concept - external), knowledge (Self-concept - internal), and career (Instrumental). However, they were unable to offer any empirical support for their propositions.

Tang and Ibrahim (1998) examined the antecedents of OCB in the United States and the Middle East (Egypt and Saudi Arabia). Their sample of 155 American and 378 Middle East employees tested the relationship between OCB and intrinsic and extrinsic satisfaction, self-esteem, McClelland's (1961) need for achievement, and work stress. They reported that organization-based self-esteem, need for achievement, and intrinsic and extrinsic job satisfaction were related to Altruism. They also noted low work-related stress and high-based self-esteem were related to Generalized Compliance. Again, the OCB field was left with a call for more succinct measures of work motivation for the prediction of organizational citizenship behaviors.

A recently developed measure of sources of motivation may offer researchers a salient variable for predicting organizational behavior (Barbuto & Scholl, 1998).

Sources of Motivation

Perhaps the most accepted and applied taxonomy of motivation is the trichotomy developed and operationalized by McClelland (1961; 1985). Despite its general acceptance, the trichotomy and its measures (TAT) have been widely criticized (see Barbuto & Scholl, 1998). Recently, a new typology of motivation sources was proposed by Leonard, Beauvais, and Scholl (1999) and operationalized with scales to measure the taxonomy (Barbuto & Scholl, 1998). This typology was further developed and tested to predict leaders' behaviors (Barbuto & Scholl, 1999). The five sources of motivation measured include intrinsic process, instrumental, self-concept-external, self-concept-internal, and goal internalization. A brief description of these sources of motivation follows (see Barbuto & Scholl, 1998).

Intrinsic Process Motivation. If a person is motivated to perform certain kinds of work or to engage in certain types of behavior for the sheer fun of it, then intrinsic process motivation is taking place. In this source of motivation, the work itself acts as the incentive, as workers enjoy what they are doing. Similar constructs to intrinsic process motivation can be found extensively in the literature. Developmental theorists have described this type of motivation in similar ways using the terms heteronomous morality (Kohlberg, 1976*)*, impulsive (Loevinger, 1976; Kegan, 1982), and to a lesser extent, pre-operational (Piaget, 1972). Other need-based descriptions similar to intrinsic process include early existence needs (Alderfer, 1969), intrinsic pleasure needs (Murray, 1964) and physiological needs (Maslow, 1954). Bandura (1986) describes sensory intrinsic motivation and physiological intrinsic motivation in terms similar to those used to describe intrinsic process motivation. This motive also has been articulated as intrinsic motivation to obtain task pleasure (Deci, 1975) and as intrinsic task motivation devoid of any external controls or rewards (Staw, 1976).

Intrinsic process differs from the classic intrinsic or internal motivation in that this motive derives from immediate internal gratification, whereas the classic definitions encompass internal challenges and achievement types of motives (in this typology, these are termed self-concept-internal). If people are motivated to perform certain kinds of work or to engage in certain types of behavior for the sheer fun of it, intrinsic process motivation is the driving force. The work itself, not the task outcome, provides the incentive because workers genuinely enjoy what they are doing (Barbuto & Scholl, 1998). Past researchers have used the term intrinsic motivation to represent personal satisfaction derived from achievement of goals or tasks. Intrinsic process is distinct from the classical interpretation of intrinsic motivation because the emphasis is on immediate enjoyment or pleasure during the activity, rather than on the satisfaction that results from achievement. The classic intrinsic motivation is better represented in this motivation taxonomy as self-concept internal (upcoming).

Instrumental Motivation. Instrumental rewards motivate individuals when they perceive their behavior will lead to certain extrinsic tangible outcomes, such as pay, promotions, bonuses, etc. This source of motivation integrates Etzioni's (1961) alienative and calculative involvement, Barnard's (1938) exchange theory, and Katz and Kahn's (1978) legal compliance and external rewards. Developmental theorists have described a similar stage as concrete operational (Piaget, 1972), instrumental (Kohlberg, 1976), imperial (Kegan, 1982), and opportunistic (Loevinger, 1976). Similar instrumental motives have been described as a need for power (Murray, 1964; McClelland, 1961), a need for safety (Maslow, 1954), or later stages of existence needs (Alderfer, 1969). Others have described extrinsic motivation (Staw, 1976; Deci, 1975; Bandura, 1986) and material inducements (Barnard, 1938) in terms similar to those used to describe instrumental motivation. Instrumental motivation is different from the classic extrinsic or external motivation in that this motive derives from tangible external rewards, whereas the classic definition focuses on social rewards and relations (in this typology, these are termed self-concept-external).

Self-Concept-External Motivation. This source of motivation tends to be externally based when the individual is primarily other-directed and seeking affirmation of traits, competencies, and values. The ideal self is adopted from role expectations of reference groups. The individual behaves in ways that satisfy reference group members, first to gain acceptance, and after achieving that, to gain status. This source of motivation is similar to Etzioni's (1961) social moral involvement, extrinsic interpersonal motivation described by Deci (1975) and Staw (1976), and Barnard's (1938) social inducements, conformity to group attitudes, and communion. This source of motivation also resembles social identity theory, where the focus is on establishing and maintaining social reference and standing (Ashford & Mael, 1989). Developmental theorists have discussed a similar motivational stage as interpersonal (Kohlberg, 1976, Kegan, 1982), early formal operational (Piaget, 1972), and conformist (Loevinger, 1976). Other researchers have described similar motivation as need for affiliation (McClelland, 1961; Murray, 1964), need for love, affection, and belonging (Maslow, 1954), and relatedness needs (Alderfer, 1969). Katz and Kahn (1978) describe employees seeking membership and seniority in organizations, approval from leaders, and approval from groups in terms similar to those used to describe external self-concept motivation. Classic articulations of social rewards or social exchanges are captured by self-concept-external motivation.

Self Concept Internal Motivation. This source of motivation will be internally based when the individual is inner-directed. In this type of motivation, the individual sets internal standards of traits, competencies, and values that become the basis for the ideal self. The person is then motivated to engage in behaviors that reinforce these standards and later achieve higher levels of competency. This source is similar to McClelland's (1961) high need for achievement, Deci's (1975) internal motivation to overcome challenges, and Katz and Kahn's (1978) ideal of internalized motivation derived from role performance. Developmental theorists have described a similar stage as full formal operational (Piaget, 1972), social system (Kohlberg, 1976), institutional (Kegan, 1982), and conscientious (Loevinger, 1976). Similar motives are described as a need for achievement (McClelland, 1961; Murray, 1964), need for esteem (Maslow, 1954), motivating factors (Herzberg, 1968), and growth needs associated with developing one's potential (Alderfer, 1969). Bandura (1986) describes self-evaluative mechanisms, self-regulation, and personal standards in terms similar to those used to describe internal self-concept motivation. Katz and Kahn (1978) describe a motive similar to internalized motivation as self-expression derived from role performance. This motive also has been described as intrinsic motivation to overcome challenges (Deci, 1975) and intrinsic motivation to pursue personal achievement (Staw, 1976).

Goal Internalization Motivation. Behavior motivated by goal internalization occurs when the individual adopts attitudes and behaviors because their content is congruent with the individual's personal value system. The worker believes in the cause and is therefore motivated to work toward the goal of the collective. This source of motivation is similar to Kelman's (1958) value system, Katz and Kahn's (1978) internalized values, Deci's internal valence for outcome (1975), and Etzioni's (1961) pure moral involvement. Developmental theorists describe a similar motivational stage as post-formal operational (Piaget, 1972), principled orientation (Kohlberg, 1976), inter-individual (Kegan, 1982), and autonomous (Loevinger, 1976). Need theorists describe a similar motive as self-actualization (Maslow, 1954).

Goal internalization is different from the previous four sources of motivation because it features the removal of self-interest (Barbuto & Scholl, 1998). Motivation from this source occurs because followers believe in the cause. With intrinsic process motivation, followers need to enjoy the work being performed. With instrumental motivation, followers need an incentive or contingent reward to perform the work. With self-concept-external motivation, followers need to believe their reputation or image will be enhanced if they comply. With self-concept-internal motivation, followers need to have a personal challenge to comply. With goal internalization, however, followers do not require any strong inducements beyond a belief that the goals of the organization can be attained with their assistance. If all workers were extremely high in goal internalization motivation and extremely low in each of the remaining four sources of motivation, leaders would need only talk about the goals of the organization and what must be done to accomplish them. If followers believe in the articulated goals (perhaps a big 'if'), they will be motivated to perform whatever tasks are necessary to achieve these goals.

Sources of Motivation and Organizational Citizenship Behavior

Barbuto and Scholl (1999) used leaders' sources of motivation to predict leaders' influence tactics and found strong correlations. They also examined the relationship between the perceived motivation of the follower and the influence tactic used by the leader, again demonstrating strong relationships. Barbuto, Fritz, and Marx (2000) used motivation to predict transformational behaviors and also found significant relationships. The results of this study were particularly telling because McClelland's needs also were used as a predictor. The motivation sources (Barbuto & Scholl, 1998) were much stronger predictors of leaders' behavior than was McClelland's construct. This preliminary body of research demonstrated that an individual's source of motivation might account for significant variance in both leader and follower behaviors. It is with this optimism that we approached this study, to examine the relationship between sources of motivation and organizational citizenship behaviors.

This current study examines the relationship between sources of motivation and organizational citizenship behavior. Several researchers have suggested an individual's motivation will be significantly related to his or her organizational citizenship behaviors (Penner, et al., 1997; Tang & Ibrahim, 1998). Tang and Ibrahim (1998) noted statistically significant relationships between three measures of motivation and organizational citizenship behavior. Previous research also has reported significant relationships between the sources of motivation and leaders' behaviors (Barbuto & Scholl, 1999; Barbuto, et al., 2000). These studies found significant relationships between the sources of motivation and leader-used influence tactics, transformational leadership behaviors, and follower compliance. Finally, research has shown that leaders rely on their perceptions of follows' motives to rate the employees' organizational citizenship behaviors. Thus, it can be reasonably expected that an employee's sources of motivation will share some relationship with the organizational citizenship behaviors he or she displays.

Table 1

Integrative Typology of Motivation Sources (Barbuto & Scholl, 1998)

Theorist	Intrinsic Process	Instrumental	S.C.-External	S.C.-Internal	Goal Internalization
Alderfer (1969)	Existence	N/A	Relatedness	Growth	N/A
Maslow (1954)	Physiological	Safety	Love	Esteem	Self Actualization
Herzberg (1968)	N/A	Satisfiers	Satisfiers	Motivators	N/A
Bandura (1986)	Sensory Intrinsic Physiological	Extrinsic	N/A	Personal Standards Self Regulation	N/A
Katz & Kahn (1978)	N/A	Legal Compliance	Membership Approval	Role Performance	Internalized Values
Etzioni (1975)	N/A	Calculative/ Alienative	Social Moral	N/A	Pure Moral
Deci (1975)	Task Pleasure	Extrinsic	Interpersonal Challenges	Overcoming	Outcome Valence
Piaget (1972)	Preoperational	Concrete	Formal	Full-Formal	Post-Formal
Kohlberg (1976)	Heteronomous	Instrumental	Interpersonal	Social System	Principled
Kegan (1982)	Impulsive	Imperial	Interpersonal	Institutional	Inter-Individual
Loevinger (1976)	Impulsive	Opportunistic	Conformist	Conscientious	Autonomous
McClelland (1961)	N/A	Power	Affiliation	Achievement	N/A
Murray (1964)	Intrinsic Pleasure	Power	Affiliation	Achievement	N/A
Barnard (1938)	N/A	Material Inducements	Social Inducements	N/A	N/A

Hypothesis 1: Employees' sources of motivation will relate to their organizational citizenship behaviors.

Individuals motivated by intrinsic process are motivated to participate in activities they enjoy. They exhibit behaviors that create a pleasant working environment for themselves and their co-workers. Previous studies have demonstrated, however, that this motive is not predictive of organizational behavior (Barbuto & Scholl, 1998; 1999; Barbuto, et al., 2000). We expect this trend to continue. Instrumentally motivated individuals are motivated to participate in formally rewarded activities. They perform tasks and demonstrate behaviors to gain tangible rewards such as pay increases, promotions and added benefits (Barbuto & Scholl, 1998). Since organizational citizenship behaviors are not formally rewarded, we expect that instrumental motivation will share a negative relationship with organizational citizenship behaviors.

Self-concept-external motivation motivates individuals through activities that reaffirm their traits, competencies, and values. These individuals pursue tasks and demonstrate behaviors that earn them social acceptance and status in reference groups. In earlier work, Barbuto and Scholl (1998) suggested similarities between self-concept-external motivation and McClelland's (1961) need for affiliation. Tang and Ibrahim (1998) found no relationship between employees' need for affiliation and organizational citizenship behaviors. We expect that individuals high in this motive will not demonstrate organizational citizenship behaviors, because they require some element of social reward for their efforts. For this reason, we expect a negative relationship with OCB.

Individuals high in self-concept-internal motivation are motivated to meet their personal standards and pursue activities that require their unique skills. These individuals may be more inclined to pursue their organizational goals, and thus exhibit organizational citizenship behaviors.

The same can be said for goal-internalized motivation, where the emphasis on the goals of the organization motivates performance (Barbuto & Scholl, 1999). Tang and Ibrahim (1998) found that organizational citizenship behavior is related to intrinsic satisfaction (similar to self-concept-internal and goal internalization), extrinsic satisfaction, and McClelland's (1961) need for achievement (similar to self-concept-internal). Tang and Ibrahim (1998) noted a significant correlation with Maslow's (1954) esteem motives (similar to self-concept-internal), and organizational citizenship behavior. Thus, we expect that both self-concept internal and goal-internalized motivation will be positively related to organizational citizenship behaviors.

Hypothesis 2a: Employees' intrinsic process motivation will share no relationship with organizational citizenship behaviors.

Hypothesis 2b: Employees' instrumental motivation will share a negative relationship with organizational citizenship behaviors.

Hypothesis 2c: Employees' self-concept-external motivation will share a negative relationship with organizational citizenship behaviors.

Hypothesis 2d: Employees' self-concept-internal motivation will be positively related to organizational citizenship behaviors.

Hypothesis 2e: Employees' goal internalized motivation will be positively related to organizational citizenship behaviors.

Methodology

Participants

The data for this analysis were collected from 175 employees and their supervisors from 31 branches of two agricultural cooperatives from a Midwest state in the U.S. Seventy-eight percent of the employees were men, and the average tenure with the cooperatives exceeded seven years. All were high school graduates and a small percentage (20%) had earned college degrees. The sample could be best characterized as working-middle class.

Measures

The Motivation Sources Inventory (Barbuto & Scholl, 1998) was used to measure an employee's five sources of motivation. This instrument has been used to predict leader influence tactics (Barbuto & Scholl, 1999), transformational leadership behaviors (Barbuto, et al., 2000) and follower compliance (Barbuto, 2000). It has shown to be both reliable and valid in reported studies, producing coefficient α of .83 - .92 (See Table 2 for sample items).

Organizational Citizenship Behavior. OCBs were measured using a modified version of the Smith et al. (1983) instrument measuring altruism and generalized compliance. Modifications of this instrument have been used frequently in the organizational citizenship behavior literature and have been judged reliable and valid (Aquino, 1995; Schappe, 1998; Tang & Ibrahim, 1998). Similar to Schappe's (1998) measurement of OCB, the instrument used in this study consists of three items measuring organizational citizenship behavior-individual and three items measuring organizational citizenship behavior-organization. These six items were summated to arrive at an OCB score for each employee. The six questions were scored using a Likert scale ranging from 1 to 4. (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). Questions 2, 3 and 6 were reverse-scored. Since leader ratings were used, the questions had to be further modified to assess the frequency of organizational citizenship behaviors (See Table 3 for the complete instrument used to measure OCB).

Table 2

Sample Items for the Motivation Sources Inventory (Barbuto & Scholl, 1998)

Source of Motivation	Sample Question
Intrinsic Process	I would prefer to do things that are fun
Instrumental	Job requirements will determine how hard I will work
Self-concept-External	It is important to me that others approve of my behavior
Self-concept-Internal	Decisions I make will reflect high standards that I set for myself
Goal Internalization	I would not work for a company if I didn't agree with its mission

Table 3

The Complete Organizational Citizenship Behavior Questionnaire (2001)

1. (This Person) helps others who have been absent.
2. (This Person) misses work often.
3. (This Person) performs only required tasks.
4. (This Person) misses work only when necessary.
5. (This Person) helps others who have heavy workloads.
6. (This Person) takes extra breaks while at work.

Procedures

Cooperative supervisors distributed the motivation sources inventory to employees and the data were collected in person by the researchers. Participation in this research was voluntary, and participants were given the opportunity to withdraw from the study at any time during or after data collection. A strong response rate (86.1%) was achieved.

Information about the employees' organizational citizenship behaviors was collected from their supervisors via phone interviews. The researchers contacted the supervisor of each employee who completed the Motivation Sources Inventory to schedule a time to conduct the survey. At the scheduled time, the interviewer phoned the leader and conducted the six-item questionnaire of Organizational Citizenship Behavior. A structured script was used to ensure uniformity of the data collection procedures. Leaders were guaranteed full confidentiality and were encouraged to ask questions and add comments. Ultimately, an executive summary outlining the results of this study was provided for the presidents of the companies who had given permission for the study.

Analysis and Results

Results of Reliability Testing

The means, standard deviations, coefficient alphas, and correlations were calculated for the variables of interest (See Table 1). Both Organizational Citizenship Behavior subscales (Organizational Citizenship Behavior -Individual $\alpha = .89$, Organizational Citizenship Behavior - Organization $\alpha = .79$) had reliabilities above or close to the desired alpha level of .80. The motivation sub-scales of the motivation sources inventory were adequate, but not impressive, with reliabilities ranging from .62 to .80. (Intrinsic Process $\alpha = .74$, Instrumental $\alpha = .62$, Self-Concept-External $\alpha = .71$, Self-Concept-Internal $\alpha = .80$, Goal Internalization $\alpha = .66$). These coefficients were lower than those found in previously reported studies (Barbuto & Scholl; 1998; 1999; Barbuto, et al., 2000).

Results of Simple Statistics and Zero-Order Correlation Testing

Hypothesis 1 was supported, as several relationships were found between motivation and OCB. The specific hypotheses (2a-e) revealed some intriguing results. Hypothesis 2a was supported, as no relationship was found between employees' intrinsic process motivation and the organizational citizenship behaviors they displayed. Hypothesis 2b was strongly supported, as significant negative correlations were found between employees' instrumental motivation and OCB-total (r=-.15, p<.05), OCB-individual (r=-.15, p<.05), and OCB-organization (r=-.13, p<.05). Hypothesis 2c was marginally supported, as self-concept-external motivation shared a negative relationship with OCB-organization (r=-.15, p<.05). Hypothesis 2d was strongly supported as self-concept-internal motivation was positively related to OCB-total (r=.15*, p<.05), OCB-individual (r=.20, p<.01), and OCB-organization (r=.15, p<.05). Contrary to expectations, goal internalization was not significantly correlated to any of the organizational citizenship behavior measures. No hypotheses were developed relating to gender; however, male gender was negatively correlated with organizational citizenship behavior -organization (r=-.15, p<.05). While many of the hypothesized relationships were supported by significant relationships in the predicted direction, these relationships were small.

Table 4

Means, Standard Deviations, Scale Reliabilities and Inter-correlations (N=175)

Variables	M	SD	1	2	3	4	5	6	7	8
1 Total OCB	18.48	3.37	-							
2 OCB-I	8.99	2.00	.59**	**.89**						
3 OCB-O	9.49	1.88	.55**	.49**	**.79**					
4 Intrinsic Proc	19.32	5.49	-.07	.06	-.05	**.74**				
5 Instrumental	19.18	5.31	-.15*	-.16*	-.13*	.54**	**.62**			
6 SCE	16.74	5.87	-.05	.03	-.15*	.40**	.54**	**.71**		
7 SCI	28.03	4.17	.15*	.20**	.15*	.07	.05	.18*	**.80**	
8 Goal Internal	19.27	5.14	.05	.01	-.03	.51**	.38**	.35**	.31**	**.66**
9 Gender (male)	.80	.40	-.05	-.07	-.15*	-.00	.08	.01	.03	.01

Note. Total OCB = Total Organizational Behavior Score; OCB-I = Organizational Citizenship Behavior-Individual; OCB-O = Organizational Citizenship Behavior - Organization; SCE = Self-concept External; SCI = Self-concept Internal; Goal = Goal Internalization.
*p <.05, **p< .01 (one-tailed test)

Discussion

Several theoretical implications arise from this study. A great deal of research in the organizational citizenship behavior literature has focused on the ability of dispositional variables to predict organizational citizenship behavior (Organ, 1990, Organ & Lingl, 1995; Tang & Ibrahim, 1998). This study aimed to contribute to this knowledge base, and the findings support the continued use of dispositional variables for predicting organizational citizenship behavior, for several reasons. First, significant (but relatively weak) relationships were found between specific sources of motivation and organizational citizenship behavior. Also, this study found significant relationships between the sources of motivation and specific items on the organizational citizenship behavior questionnaire. These findings are similar to those supported by previous research using motivation to predict organizational citizenship behavior (Tang & Ibrahim, 1998; Penner et al., 1997).

Second, the results of this study support previous research findings that individuals in Midwestern agriculturally related businesses report higher levels of self-concept-internal motivation than any of the other sources (Barbuto, et al., 2000). This finding is important: Because self-concept-internal motivation is based on personal challenge and self-authorship, organizational policies and procedures will not affect these individuals' motivation.

Finally, since all levels of management were treated the same in this study, the results may have overlooked a salient situational factor. No research has examined the impact of an individual's management level on organizational citizenship behavior. Theoretically, as the leader obtains a higher level within the organization, the opportunity to assist others with their work may be limited and the amount of time spent at work may increase. As a result, organizational citizenship behavior may naturally decrease as individuals progress upward in an organization. Management level of employees was not identified in this study, but this variable may be a valuable one for future inquiries.

Implications for Practice

Based on the findings of this study, there may be several cautious implications for the practices of business and leadership. First, managers are cautioned that the relationships found in this study, while statistically significant, were relatively low, accounting for little variance. Further research of these variables is necessary to ascertain, with confidence, these relationships. One general implication is the realization that an individual's sources of motivation can have an impact on his or her level of organizational citizenship behavior. Specifically, individuals high in instrumental and self-concept-external motivation demonstrated low levels of organizational citizenship behaviors. Also, individuals' self-concept-internal motivation was positively correlated with organizational citizenship behaviors. Better assessment of their followers' source of motivation may allow leaders to develop better techniques and strategies to motivate followers and persuade them to exhibit more organizational citizenship behaviors (Barbuto, 2000).

Next, even though the relationships were significant, the amount of variance they accounted for was low. For practitioners, this suggests that situational factors tend to account for more variance in organizational citizenship behavior than dispositional factors (Organ & Ryan, 1995; Organ & Lingl, 1995). Managers often report that they are searching for self-motivated employees, assuming these individuals will be most productive. Findings in this study suggest that, while there is a relationship between an individual's self-concept-internal motivation and his or her organizational citizenship behavior, the low variance indicates that factors other than motivation sources alone will be more salient predictors of employee performance.

Finally, qualitative responses from leaders support previous research suggesting that leaders use observations of organizational citizenship behavior to rate follower performance (MacKenzie, Podsakoff & Fetter, 1993; Podsakoff & MacKenzie, 1994). One leader responded that this test explained why a particular employee was no longer with the organization, and another leader said he wished he could have had this test to assess a former employee's behavior before he employed the individual. These findings support the Pond, et al. (1997) conclusion that organizational citizenship behaviors are contextual and situational.

Limitations and Future Research

One limitation of this study is that it focused on only one type of business. The target organizations share the same geographic location and are similar in the services they provide. The homogeneity of the sample limits the generalizability of results. However, since organizational citizenship behavior must be examined within a given context, the sample was useful for examining agriculturally based industry trends in organizational citizenship behavior.

Future research needs to further examine the relationship between motivation and organizational citizenship behavior. The findings of this study are consistent with those of Tang and Ibrahim (1998) in explaining relationships between these variables. Future research needs to examine different samples of individuals who may be motivated differently than those in service-based businesses (non-profit directors and board members, stockbrokers, and students) to further understand this relationship.

The motivation sources inventory, which was used to measure sources of motivation in this study, demonstrated poorer psychometric properties in this study than it had in previous work (Barbuto & Scholl; 1998, 1999). One explanation for this difference is the education level of the subjects in this study, which was lower (20% had bachelors) than in previous studies (60%+ had bachelor's degrees). The instrument may be less suited for individuals with lower education levels. We recommend further development of the motivation subscales to improve future studies.

Research is still needed on the antecedents of organizational citizenship behavior. Although many studies suggest these behaviors are important to the success of individuals and organizations (MacKenzie, et al., 1993; Podsakoff & MacKenzie, 1994), after almost 17 years of research, the antecedents of these behaviors are still relatively undetermined. When the antecedents of these behaviors are discovered, leaders may be able to effectively increase the organizational citizenship behavior in their followers.

Finally, the results of this study should encourage further examination of the relationship between motivation and organizational citizenship behavior, inspire future research examining the impact of the sources of motivation in predicting follower and leader behaviors, and add to the research literature on organizational citizenship behavior and motivation.

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A Problem-oriented Approach to Teaching Agriscience Compared with Lecture and Study Questions: Effects on Achievement and Attitude of High School Students

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Abstract

The agricultural education profession has long advocated the problem-solving approach to teaching as superior in producing student learning and positive attitudes toward learning. This study compared the effects on both student cognitive achievement and attitude toward the subject matter of a problem-oriented approach to teaching agriscience with a lecture-and-study questions approach. The subjects in this study were high school students in two agricultural education programs in Arkansas during Spring of 2000. The study utilized a non-equivalent control group design, with a pre-test, an immediate and a delayed post-test, and an internal replication. Two different lessons in the agricultural sciences were taught. No statistically significant differences were found between the treatments on either the immediate or the delayed subject-matter post-tests for either subject matter lesson. Additionally, no significant differences were found in student attitudes toward the subject matter as a result of the treatments. Based on these results, the problem-solving and traditional approaches to teaching appeared to be equally effective in promoting student learning and attitudes toward the subject matter.

Introduction/Theoretical Framework

Teachers of agricultural science and technology possess a love for their subject matter. They often assume that their students share the same enthusiasm for agriculture and learning about it. When students exhibit behaviors and attitudes about learning which are not at the same level as that of the teacher, the teacher may react by believing that the students have little interest in the subject. However, students' negative attitudes toward learning may be related to the method of instruction. A study comparing hands-on activities versus worksheets in reinforcing instruction in agriscience (Johnson, Wardlow & Frankin, 1997) found that student attitudes toward learning were significantly enhanced by participating in hands-on learning activities compared with learning by using worksheets.

High school students may not share an enjoyment for learning just to possess more knowledge, as the adult teacher does. If students see learning as knowing an answer and remembering it for a multiple choice test, then they will surely lose interest in learning (Bracey, 1998). Therefore, it is absolutely necessary that adults who educate adolescents understand the limitations that they put upon themselves and their students by adhering to traditional methods of teaching. Teachers should create an environment in which learning takes place by the action of the learner.

Gerald Bracey (1998) stated that teachers have profoundly held ideas about the way children learn and that these ideas are incredibly resistant to change; and they are wrong. Children bring to the classroom their own profoundly held ideas about how the world works. These ideas are also resistant to change and teachers need to change them (Bracey, 1998). Encouraging students to remain in a passive role in the classroom has further unfortunate effects such as promoting rote learning, obscuring the differences between high school and college thinking and riveting intellectually immature students to a naive view of knowledge and its acquisition (Allen, Duch & Groh, 1996). If teachers continue to present information to students only with the motivation to earn a passing grade, these learners will not realize the value of education and will continue to function in this inactive learning mode throughout all of their intellectual growth. They will continue to see knowledge and its acquisition as only an end, not as a beginning to self-improvement.

To assess the progress and success of students, educators have relied too heavily on the memorization of others' answers to inquiries and their methods of discovering those answers. Over one half century ago, John Dewey was convinced that education had failed because it tried to get students to learn solutions rather than to investigate the problems and engage in inquiry for themselves (Lipman, 1991). The structure of traditional education, with teachers as lecturers bestowing information upon bound classes of stoic learners, erects numerous roadblocks to students becoming actively involved in their own learning (Allen, Duch & Groh, 1996). The roadblock is that students are not able to create a sense of ownership for their learning because they must keep it structured to the instructor's preferences. In reality, each student has a different strategy for learning (Sankaran & Bui, 2000). Some strategies may fit an instructor's preferences; some may not. Therefore, instructors must provide the opportunity for students to explore information and learn it in their own way.

According to Barr and Tagg (1995) two different types of teaching behaviors exist and two different types of student learning strategies exist. They wrote that teachers educate from either an *instructional paradigm* that focuses on what the teacher does in the classroom or from a *learning paradigm* that focuses on whether and how students learn rather that teacher behavior. Most teachers teach from the instructional paradigm that is less concerned with how students learn and more about the teacher's actions (Lasley, 1998). Learning strategies refer to the different activities that students apply and by which learning is achieved (Sankaran & Bui, 2000).

Two different types of learning strategies have been proposed: deep, to satisfy curiosity and to understand the meaning of a task by an in-depth study of a subject, and surface, which is just to satisfy requirements by memorizing facts well enough to earn a good grade without fully mastering the material (Sankaran & Bui, 2000). For teachers to foster the deep learning strategy they must teach outside of the instructional paradigm. In other words, teachers must present information in a way that encourages students to seek their own answers using their own strategies. Gallagher and Stepien (1996) wrote that instruction which fosters higher order thinking can result in learners who can construct meaningful connections between meaningful pieces of information, transfer information to new settings, and are motivated to learn. By teaching students how to think and learn independently, teachers increase their power to think and to learn outside of the classroom (Kahler, Miller & Rollins, 1988).

These statements support the need for a teaching method that is different from the traditional methods of lecture and rote memorization still used today by teachers who view education from the instructional paradigm and by students who use surface learning strategies. The method needed involves problem-solving by directed inquiry.

If a goal is to have more students eventually choosing careers in agriculture, they must see that their learning is relevant to that work. Bruner (1973) explained that if students are going to master culturally relevant skills, they must see education as a process that is relevant to achieving. It is through the exercise of problem-solving and discovery that a student learns the working heuristics of discovery; and the more a student practices these skills, the more likely that student is to generalize what s/he has learned into a style of problem-solving or inquiry that serves for any kind of task that he may encounter.

The problem-oriented approach has been used as an educational tool for many years. Educators such as John Dewey proposed it nearly a century ago. According to Barrow (1996), problem-based learning was reintroduced into medical education in the 1960s to better prepare physicians for the demands of professional practice.

There is opposition to the use of the problem-oriented approach as a method of education. Critics of the problem-solving approach say that while the approach has a sound theoretical base, it has been accepted with very little empirical evidence to either defend or reject its usefulness in the classroom (Dyer & Osborne, 1999). Additionally, Dyer and Osborne (1999) found that problem-solving instruction might not fit the learning style of some students. In fact, abstract learners may not recognize problems as such when presented to them.

Problem-solving instruction may be an effective instructional alternative, but little empirical evidence from school settings currently exists concerning teaching for knowledge acquisition using this approach. However, a study of agriculture students from Illinois which compared the effects of the problem-solving approach to the subject matter approach found the problem-solving approach to be no more or less effective in producing student achievement or knowledge retention (Flowers & Osborne, 1988). Flowers (1986) reported no significant differences in the short-term retention of subject matter when the problem-solving approach was compared to the subject matter approach. The problem-solving approach was, however, effective in reducing achievement loss when compared to the subject matter approach (Dyer & Osborne, 1999).

Purpose of the Study

The purpose of this study was to compare the effects on both student cognitive achievement and attitudes toward the subject matter of a problem-oriented approach to teaching agriscience with a lecture-and-study questions approach. The following null hypotheses were tested at the 0.10 alpha level:

1. In an animal diseases instructional unit, there will be no significant differences on either immediate or delayed cognitive achievement post-test scores, nor on students' attitudes toward the subject matter, between students completing a problem-solving instructional activity and students completing a lecture-and-study questions activity.

2. In a plant poisons instructional unit, there will be no significant differences on either immediate or delayed cognitive achievement post-test scores, nor on students' attitudes toward the subject matter, between students completing a problem-solving instructional activity and students completing a lecture-and-study questions activity.

Methods

This was a field-based study using high school students enrolled in agriculture courses. Such a study has limitations with regard to the possibility of non-equivalent groups, subject mortality, as well as the necessary use of teacher-made tests based on the specific subject matter being taught. Given those limitations the study was conducted using the non-equivalent control group design, as described by Campbell and Stanley (1968), with an internal replication. The internal replication was to control for the potential error associated with potentially non-equivalent groups.

The subjects in this study were high school students in two agricultural education programs in Arkansas during the spring term of 2000. An intact animal science class from each program was assigned to either the treatment group or the control group. The treatment consisted of a lesson taught using a problem-oriented approach to teaching and learning about animal diseases. The control group received the same lesson taught using traditional lecture and study questions. Upon the conclusion of the first treatment and testing, the two groups were reversed and a lesson was taught about poisonous plants. The control group from the previous lesson received the experimental treatment, the problem-oriented approach. The group receiving the experimental treatment from the animal diseases lesson received the traditional lecture and study question method for poisonous plants lesson. For each lesson, each group received a pretest, a post-test, and a two-week delayed post-test based on the subject matter being taught. Each group also completed a post-test instrument to assess their attitudes toward the subject matter.

The use of intact classrooms poses a risk of error of non-equivalence. However, when conducting research with high school teachers and their students, it becomes difficult to randomly assign subjects to treatments. Thus, to determine whether the groups were equivalent, pretests were given for both lessons and pretest scores were compared to determine if significant differences existed.

Equivalent detailed lesson plans were written for both the experimental and control groups, and for both of the subject matter areas. These lesson plans were reviewed by the panel of experts and revised to insure equivalency between treatments. Prior to their use, the lesson plans were reviewed by the teachers who implemented them to insure that they were administered to all students in the same manner.

The instruments consisted of teacher-made subject matter mastery tests based on the learner objectives identified in the detailed written lesson plans. These instruments were comprised of 22 to 35 objective questions for which student responses were recorded as either correct or incorrect. The instruments were reviewed and evaluated by a panel of experts to ensure content validity. This panel included university animal science faculty members, university agricultural education faculty members, and high school agriculture teachers. The Kuder-Richardson (KR-20) reliability coefficients were calculated to assess the internal consistency of the subject matter instruments. Student attitudes toward the subject matter were measured using modified versions of the Attitude Toward Any School Subject instrument (Purdue Research Foundation, 1986). Each instrument consisted of 20 attitudinal statements concerning the subject matter to which students responded using a 1 to 7 response scale (1 = strongly disagree; 7 = strongly agree). Coefficient alpha reliability estimates were calculated for each instrument in the study.

Results

For the teacher-made tests for both lessons, which were based on the objectives of each of the lessons, Kuder-Richardson 20 reliability coefficients were calculated to determine internal consistency. While the tests were designed to be equivalent forms of teacher-made assessment devices, differences did exist. Thus, KR-20 coefficients were calculated for each instrument. The results are presented in Table 1. Internal consistency estimates of the instruments used to assess attitude toward the subject matter were calculated using Cronbach's alpha. These values were 0.85 for the animal diseases instrument and 0.71 for the poisonous plants instrument.

Table 1. KR-20 Internal Consistency Estimates of Teacher-Made Subject-Matter Instruments

Instrument	Administration	KR-20
Animal Diseases	Pretest	0.50
Animal Diseases	Post-test	0.88
Animal Diseases	Delayed Post-test	0.78
Poisonous Plants	Pretest	0.54
Poisonous Plants	Post-test	0.17
Poisonous Plants	Delayed Post-test	0.46

Animal diseases lesson. To determine if differences existed between the experimental and control groups on the animal diseases lesson, t-tests were utilized at an a priori alpha level of 0.10. T-tests were deemed appropriate rather than analysis of co-variance (ANCOVA) after a simple t-test was performed on the animal diseases pretest scores of both groups and it was determined that no significant differences existed between the groups on their level of knowledge about the subject matter prior to the administration of the treatments ($t = 0.68$; 2, 37). On the 30-item pretest, the experimental group (to be taught using a problem approach) earned a mean score of 19.35 ($n = 20$; $SD = 3.22$) and the control group (to be taught using lecture and study questions) earned a mean score of 18.63 ($n = 19$; $SD = 3.40$) (See Table 2.)

Results of the comparison between the groups on the immediate post-test revealed no significant difference at the 0.10 alpha level (t = 0.84; 2, 32). Therefore, the null hypothesis is

Table 2. Comparisons of Test Scores by Treatments

Subject Area / Test Administration	Treatment Group[1]	n	#items	Mean	S.D.	t-value
Animal Diseases						
Pre-test	Experimental	20	30	19.35	3.22	
	Control	19	30	18.63	3.40	0.68
Post-test	Experimental	18	25	20.83	3.76	
	Control	16	25	19.44	5.77	0.84
Delayed Post-test	Experimental	12	35	26.75	5.05	
	Control	14	35	26.57	4.85	0.09
Poisonous Plants						
Pretest	Experimental	10	31	21.50	3.50	
	Control	8	31	20.50	2.67	0.67
Post-test	Experimental	8	22	16.62	2.00	
	Control	7	22	15.71	1.89	0.90
Delayed Post-test	Experimental	8	28	22.62	2.39	
	Control	7	28	19.71	3.25	0.62

[1]Experimental = Problem-Oriented Approach; Control = Lecture and Study Questions.
*No significant differences at the 0.10 alpha level.

retained. The group receiving the problem-oriented approach to teaching earned a mean score of 20.83 (SD = 3.76) while the group receiving the traditional lecture and study questions earned a mean score of 19.44 (SD = 5.77) on the 25 item post-test. The analysis of the scores on the 35 item delayed post-test revealed that the problem-oriented group earned a 26.75 (SD = 5.50) and the lecture-study question group earned a 26.57 (SD = 4.85). This was not found to be significantly different (t = 0.09; 2, 24). The null hypothesis is retained for the delayed post-test.

Poisonous plants lesson - To determine if differences existed between the experimental and control groups prior to the poisonous plants lesson, a t-test was conducted on the pretest scores of the groups. These data are presented in Table 2. No significant difference (alpha = 0.10) between the groups was found (t=0.67; 2,16) on the 31 item pretest. The experimental group (problem approach) earned a mean score of 21.50 (SD = 3.50) while the control group (lecture and study questions) scored a mean of 20.50 (SD = 2.67). Therefore, t-tests were conducted to compare the experimental group with the control group on both the immediate post-test and the delayed post-test.

The immediate post-test scores in the poisonous plants lesson earned by students who were administered the problem-oriented approach was 16.62 (SD = 2.00) on the 22 item test. Students who participated in the lecture-study question instruction earned a mean score of 15.71 (SD = 1.89). This difference was not found to be statistically significant (t = 0.90; 2, 13). The null hypothesis is therefore retained. When the delayed post-test was administered, students who had experienced the problem approach earned a mean score of 22.62 (SD = 2.39, 28 item test), and students who were in the lecture-study question group earned a mean score of 19.71 (SD = 3.25). This was not a significant difference (t=0.62; 2,13). The null hypothesis is retained.

Attitude Toward the Subject Matter. After the immediate post-test was administered in each group, the "Attitude Toward the Subject Matter" instrument was administered to each student. Table 3 presents the results of the t-tests. These analyses indicated that there were no significant differences (alpha = 0.10) between the groups in their attitudes toward the subject matter for either the animal diseases or the poisonous plants lesson. Students in both the problem-oriented approach and the lecture-study question approach had similar attitudes toward the subject as a result of either instructional mode.

Table 3. Comparisons of Attitude Toward the Subject Matter by Treatments.

Subject Area	Group[1]	n	#items	Mean[2]	S.D.	t-value
Animal Diseases	Experimental	7	20	110.57	16.25	
	Control	8	20	100.63	12.96	1.32
Poisonous Plants	Experimental	8	20	104.13	8.76	
	Control	6	20	105.67	11.36	0.25

[1]Experimental = Problem-Oriented Approach; Control = Lecture and Study Questions.
[2]Possible range of scores = 20 to 140, Response categories = 1 to 7.
*No significant differences at the 0.10 alpha level.

Conclusions and Recommendations

The experimental treatment, a problem-oriented approach to teaching two lessons to high school students in animal science courses, resulted in no statistically significant differences when compared with the use of a traditional lecture and study question approach to teaching on the dependent variable, student learning, on either immediate or delayed post-test achievement tests. Students in either instructional approach learned the subject matter equally well, and retained it equally well.

When students' attitudes toward the subject matter were measured immediately following participation in the lesson, the attitudes of students who were taught using the problem-oriented approach were not significantly different than those of students who were taught using the traditional approach. Students seem to have no preference toward learning by either instructional approach.

These results are not surprising and are consistent with previous research which compared instructional approaches among high school agriculture students (Johnson, Wardlow & Franklin, 1997). While the study measured effect on retention of the subject, both short-term and long-term (two week), it did not assess the level of learning. The possibility exists that the subject matter that was taught and expected to be learned in this study was at the lower levels of cognition, and that problem-oriented approaches would prove more effective at producing measurable differences at higher levels of subject matter complexity and levels of cognition. This question should be the subject of further study.

This was a field-based study, using intact classrooms of high school students. While the use of intact classrooms is less desirable than the random assignment of subjects to treatments, it is more feasible within school-based field studies such as in single-teacher agriculture programs. This precipitated the use of the internal replication to insure that all subjects received both treatments. It also served as a rationale to administer the pretests. This may have lead to some pretest sensitization, precluding the production of sufficient variance in the post-test scores. Random assignment of subjects to treatments could eliminate the need for the pre-tests.

Some research mortality occurred, reducing the numbers of students who completed the study. Some students missed the administration of the post-tests because of competing school activities and absences. While they were allowed to complete the tests, their scores were not included in the study because of the possibility of contamination from other students. This could have had some effect on the results. Increasing the numbers of subjects in the study would allow for more robust statistical analysis procedures. Further, producing three alternate forms of the instruments across two different lessons to be used in actual classroom settings, including their use for grading purposes, is a difficult task. Attempts were made to insure the validity and reliability of the instruments. However, the utility of the instruments as classroom subject matter tests was a primary consideration.

Since this study was of a short duration, across only two units of subject matter, the question of whether long-term use of particular teaching approaches would result in measurable differences between them should be studied. Would a longer term, over more units of instruction, likely result in significant differences in learning, or in attitudes toward the subject matter?

One could also question whether the treatments were sufficiently different to maximize any possible differences between the groups. Were the different forms of each lesson too much alike? Were the instructional approaches too much alike? Did the treatments maximize the possible variance within the study? Were the instruments capable of measuring real differences between the student knowledge, the dependent variable of interest?

This study serves as an exploratory study of alternative teaching approaches among high school agriculture students. The agricultural education profession has long advocated the problem-solving approach as superior in producing student learning and satisfaction toward learning. This study, and studies like it, deserve expanding in order to better substantiate that claim. Such studies will continue to serve agricultural educators in their quest to improve their instructional strategies.

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Don't Lecture Me! Motivating Agriculture Students to Learn

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Abstract

The October 27, 2000, issue of the *Chronicle of Higher Education* emphasized that one of the nine inevitable changes in higher education is the shift from focus on teaching to focus on learning. Thus, understanding what motivates students to learn may provide teachers insights into elements of the learning process over which the teacher may have some control. Students in the College of Agriculture, Kansas State University, were asked to identify specific teaching styles, classroom environments, grading methods, and assignment types that motivated them to learn. Overall, the most motivating characteristics in each category were an enthusiastic and interesting teaching style, an interactive classroom environment, fair grading methods, and assignment types that provided experience relevant to the profession. The most-cited factor reducing motivation was a long, boring lecture. Students with higher GPAs tended to be more goal-oriented and internally motivated; they preferred more interaction and discussion, a clear grading system with high expectations, and frequent assignments. In contrast, students with lower GPAs were motivated more by external factors, such as the instructor's enthusiastic presentation, small classes, and hands-on assignments. Clearly, no single method can be used to motivate all students. However, this study identified many approaches an instructor can take to motivate students to learn.

Introduction

The shifting focus in higher education to learning from teaching (Levine, 2000) illustrates the need to understand what motivates students to learn. Motivation is central to student learning but has always been a challenge for teachers, because students enter the classroom with diverse backgrounds, interests, experiences, and learning styles. Certain motivational factors are at least partially under teacher control, while others rest solely with the student or are out of the control of both, such as physical facilities. For this paper, the authors concentrated on the areas over which teachers have some control.

Teacher characteristics have been found in previous research to be related to student motivation. Brophy (1987) writes that teachers who are energetic and excited about the subject

[1] The authors gratefully acknowledge the K-State College of Agriculture, Committee on Effective Instruction for facilitating this study and incorporating the results into a college-wide workshop on Motivating Students. We also thank the K-State faculty who administered the questionnaire in their classrooms and student organizations, and the students who took the time and effort to teach us about motivation through their responses.
[2] Kansas State University Agricultural Experiment Station contribution no. 00-15-J.

motivate students by spreading that enthusiasm and interest to them. In addition, teachers who motivate are respectful and positive with students, challenge them, make students feel welcome and valued, and state their expectations clearly (Damico & Roth, 1994; McKeachie, 1994; Ornstein, 1993).

Some of the intrinsic factors motivating students are a sense of competence and achievement (McKeachie, 1994). Students perform best when they can develop their own unique strengths (Ornstein, 1993). These factors demonstrate the need for activities to be located at the appropriate academic level so that the student is challenged and concurrently has the opportunity to be successful (Meece, 1991), which relates to a need to feel competent (Deci & Ryan, 1991). Other intrinsic needs identified as motivational factors include the needs for senses of belonging and control (Deci & Ryan, 1991).

Other sensory issues related to motivation include safety and security. Students who feel free to be creative and to take risks without being punished, like those who are willing to interact in the classroom discussion even if their answer is wrong, are more motivated to learn (Deci & Ryan, 1991). In addition to safety, students find motivation through a sense of fair treatment (Wankat & Oreovicz, 1993).

Both teacher and student characteristics interact to create a motivational learning environment. From a review of the literature on motivation, McCombs (1996) suggests that motivation to learn arises from both external supports and internal processes. Internal processes include the need to feel in control, competent, and connected to others. Additional internal processes are finding the activities of the course to be personally interesting, fun, meaningful, and relevant. The external supports are teachers who help the students see the relevancy of activities, give students choice and control; provide them with the personal skills or resources needed to be successful; and give them support including help, respect, and encouragement (McCombs, 1996). Several authors echo the need for students to feel that they have a voice in their own learning process (Damico & Roth, 1994; Farges, 1993; Wiggins, 1992; Ornstein, 1993).

Purpose and Objectives

Although general information about motivating students is known from the literature, little information is available about specific attributes found as motivational. Thus, this study was conducted to identify, from the student perspective, specific characteristics and activities that motivate students to learn in the College of Agriculture at Kansas State University. The objectives were to determine 1) what teaching styles, classroom environments, grading methods, and assignments best motivate these students to learn, and 2) whether or not these results differed by student grade point average (GPA) and/or year of study.

Materials and Methods

This study used qualitative data collection and analysis methods. The goal of qualitative studies is not to be generalizable to a larger population, which is often a goal of quantitative studies. Instead, the emphasis is on understanding the phenomena through collecting richer data that are poorly represented by numeric interpretations (Patton, 1990). With input from faculty and students, a qualitative questionnaire was prepared to solicit responses from students regarding attributes that motivate their learning. Questions related to the constructs of teaching style, classroom environment, grading method, and assignment types. For each construct listed in the preceding sentence, students were asked to identify a teacher at Kansas State University who motivated them and to specify the attributes that motivated them. Two additional questions asked students to identify other factors they found to be motivational and specify classroom experiences that did not motivate them. The students self reported year in school and GPA. The questionnaire was field tested prior to use and modified based on those results.

Faculty from each of ten departments and undergraduate programs in the College of Agriculture administered the questionnaire in one or more classes. Classes with a diverse group of students from different disciplines, ages, years in school, and GPAs were chosen. In total, 642 students completed and returned the questionnaire. For comparison, enrollment in the College of Agriculture was 2,074 students at the time of the study.

Data from the responses were coded by themes as they emerged from the data, a coding concept from grounded theory methodology (Glaser & Strauss, 1967). Keywords, phrases, and concepts were first identified among the data. The authors then formed themes. Following appropriate methods of analysis for qualitative data, thematic conceptual matrices were developed and are presented in the tables in this paper (Miles & Huberman, 1994).

Data also were analyzed based on GPA and year in school (student rank). Role-ordered matrices were used to analyze these data (Miles & Huberman, 1994). The authors note that, because the data were collected in Fall Semester 1998, most of the freshmen surveyed reported that they did not have a GPA yet. Therefore, they were omitted from any analysis based on GPA.

Analyzed data were shared with a student panel during the Spring Semester in 1999 for a member check to validate the findings (Lincoln & Guba, 1985).

RESULTS AND DISCUSSION

Results are discussed below. Tables present these data as well. Table 1 presents data related to motivational aspects of in-class factors, including teaching style and classroom environment. Table 3 summarizes findings regarding out-of-class factors of assignment types and grading method. Tables 2 and 4 group in-class and out-of-class factors, respectively, by student rank and GPA category. Comments within the tables are numbered with consistent numbers associated with each comment.

Teaching Style

Enthusiastic and interesting teaching styles were important to almost all of the students (see Table 1). The instructor's ability to "explain well and teach to different learning styles" was generally viewed as important as well. The teacher's ability to be "organized" and use "real-life examples" to make the material relevant also were important. The willingness of the teacher to be "helpful, caring, and interested" in the student was important to nearly all of the students

Table 1

Thematic Conceptual Matrix of Motivators related to In-Class Factors

In-Class Factor	Theme	Illustrative Quotes
Teaching Style	1. Enthusiastic, interesting	"They are excited and extremely knowledgeable about their field."
	2. Helpful, caring, interested in students	"She cares about student's learning, knows when the class is ready to move on."
	3. Explains well, teaches to different learning styles	"She takes time to thoroughly explain information and is good at figuring out when students don't understand."
	4. Uses real-life examples	"She uses lots of examples and real-life applications, so you will know the info and be comfortable with its use."
	5. Organized	"Well-organized on PowerPoint"
	6. Interactive, promotes discussion	"He has a lot of group activities that are conducive to learning."
Classroom Environment	1. Interactive with discussion	"Interaction – students as leaders."
	2. Small classes	"The instructor can look everyone in the eye and make them part of the discussion."
	3. Relaxed, laid-back, comfortable	"Instructor creates a relaxed environment yet requires individual participation."
	4. Hands-on	"You are more into the class if you are applying what you are learning."
	5. Humorous, fun	"They are always fun and positive, full of energy that rubs off on the students."

questioned. Enthusiasm was particularly important to lower-GPA (<3.0) students (see Table 2). "Interactive" and "promotes discussion" were important to seniors with higher GPAs (>3.0).

Overall, the teaching attributes that motivated students seemed to apply across student categories. However, the preference toward interaction and discussion was stronger for students of higher rank and higher GPA, who perhaps have more self-confidence in their knowledge and feel their contributions are valuable in the classroom; lower rank, lower GPA students were less motivated by this mode of teaching. Also, lower-GPA students tended to place more importance on teachers' enthusiasm and ability to make the subject interesting to the students. That is, students of lower rank and lower GPA tended to place a higher premium on teacher enthusiasm. Both these trends revealed that the higher-GPA students tended to be more internally motivated and the lower-GPA students tended to rely more heavily on methods of external motivation from the instructor.

Table 2

<u>In-Class Motivators Grouped by Student Characteristics</u>

Teaching Style by Rank	**GPA Category**	
	>3.0	**<3.0**
Seniors	1. Enthusiastic, interesting 2. Helpful, caring, student focused 3. Explains well, teaches to different learning styles 4. Uses real-life examples 5. Organized 6. Interactive, promotes discussion	1. Enthusiastic, interesting 2. Helpful, caring, student focused 3. Explains well, teaches to different learning styles 4. Uses real-life examples 5. Organized
Juniors	1. Enthusiastic, interesting 2. Helpful, caring, student focused 3. Explains well, teaches to different learning styles 4. Uses real-life examples 5. Organized	1. Enthusiastic, interesting 2. Helpful, caring, student focused 4. Uses real-life examples 5. Organized
Sophomore	2. Helpful, caring, student focused 3. Explains well, teaches to different learning styles 4. Uses real-life examples	1. Enthusiastic, interesting 3. Explains well, teaches to different learning styles 4. Uses real-life examples 5. Organized
Freshmen (no GPA)	1. Enthusiastic, interesting 2. Helpful, caring, student focused 3. Explains well, teaches to different learning styles 4. Uses real-life examples 5. Organized	
Classroom Environment by Grade		
Seniors	1. Interactive with discussion 3. Relaxed, laid-back, comfortable	2. Small classes 3. Relaxed, laid-back, comfortable 4. Hands-on 5. Humor, fun
		<u>(table continues)</u>

Juniors	1. Interactive with discussion 3. Relaxed, laid-back, comfortable	2. Small classes 3. Relaxed, laid-back, comfortable 4. Hands-on 5. Humor, fun
Sophomore	1. Interactive with discussion 5. Humor, fun	1. Interactive with discussion 2. Small classes 3. Relaxed, laid-back, comfortable
Freshmen (no GPA)	1. Interactive with discussion 2. Small classes 3. Relaxed, laid-back, comfortable 5. Humor, fun	

Classroom Environment

The most common responses are summarized in Table 1. The areas of classroom environment commonly noted among respondents were interactive with discussion, small class size, relaxed atmosphere, hands-on, and use of humor. Students with higher GPAs (>3.0) more often identified an "interactive" classroom environment as motivating, though all groups did note the importance of interactivity (see Table 2). More lower-GPA students (<3.0) identified "small classes" and a "hands-on" classroom environment as motivating. In addition, "small classes" were identified by freshmen as motivating, perhaps because they help with the transition from the high-school environment. An environment most often referred to as "relaxed" or "laid-back" was identified consistently as motivating. Finally "humor" was cited more often by lower-GPA students.

Although responses to this question did not show trends within the student-rank categories, trends often were exhibited in the GPA categories. Most often these trends seemed to indicate that environments encouraging student participation, discussion, and interaction motivated the higher-GPA students. By contrast, the lower-GPA students were motivated by environments that were hands-on with more entertainment and had fewer numbers of students in the class.

Assignment Types

In general respondents indicated preferences for assignments that were relevant to the profession, hands-on, challenging, with a clear application to the class, helpful in preparing for exams, and frequent. The most common response themes are summarized in Table 3. Factors associated with GPA and student rank are presented in Table 4. Students clearly identified assignment types with "real-life" application and "relevance to the profession" as the most important motivating factors, and this was particularly evident among lower GPA students (GPA <3.0). "Hands-on" and "challenging" assignments were cited uniformly across student rank but more frequently among lower-GPA students. Assignments that "fit the class material" and "prepare for exams" were found to motivate higher GPA students. "Frequent assignments" were preferred by more juniors and seniors and higher-GPA students.

Table 3

Thematic Conceptual Matrix of Motivators related to Out-of-Class Factors

Out-of-Class Factor	**Theme**	**Illustrative Quotes**
Assignment Types	1. Real-life assignments, relevant to profession	"We had the toughest problem imaginable. When we handed it in, we knew we could do it in industry."
	2. Hands-on	"His assignments are hands-on, where we do independent team research of a corporation."
	3. Challenging	"(Assignments) are challenging, yet let the students decide how and what to do."
	4. Fits material, applies to class	"Assignments back up what is taught in class."
	5. Prepares for exam	"Assignments go hand-in-hand with tests."
	6. Frequent assignments	"The weekly assignments motivate me to keep up."
Grading Methods	1. Fair	"Tests and assignments representative of what was learned."
	2. Partial and extra credit, reworks	"Has extra credit that helps you correct earlier errors."
	3. Higher grading scale	"Higher expectations than normal, i.e.[sic], 92% for an A."
	4. More often or weekly quizzes	"Tests every Friday to keep you on track."
	5. High expectations, challenging	"Higher expectations than normal make you study more."
	6. Variety of graded work	"Variety of assignments, not just tests because you may not be a good test taker."
	7. Clear grading system	"Structure so students know exactly where the grade comes from with good spread of points."
	8. Optional final exam	"Optional final if student is satisfied with grade prior to final."

The students preferred assignments that provided real-life experiences. Instruction that clearly related the work to realistic situations was valued by the students. The students indicated that they were motivated by frequent and challenging assignments that help them do well in the class and prepare them for careers.

Grading Method

The most commonly cited characteristics are summarized in Table 3 and include descriptors such as fair, extra credit offered, higher and clear grading scale, more frequent quizzes, higher expectations, variety of assignments, and optional final. Many motivating concepts were described here, reflecting the great diversity in both instructor grading options and student preferences. A "fair" grading system was found to be important to all students. Lower-GPA students identified "partial and extra credit or reworking assignments" as motivating (see Table 4). A "higher grading scale" was found to be important to freshmen and sophomores but was not very important to other juniors and seniors. In contrast, a grading method that has "high expectations" and is "challenging" was mentioned as motivating to juniors and seniors but was not mentioned at all by freshmen and sophomores. "More frequent or weekly quizzes" was cited as motivating by all categories of students. A "clear grading system increased in importance to higher GPA students. A "variety of graded work" was the motivating factor most commonly cited by the sophomores questioned. An "optional final exam" for students with an A or who are satisfied with their cumulative grade was cited as being motivating by higher-GPA students. Freshmen generally preferred a "curve" over "no curve," although neither method was identified as motivating by other class ranks. When these students used the term "curve," they were not referring to a statistical bell-shaped curve to distribute grades but to the use of additional points to increase the class average. This point was clarified by the student panel that reviewed the findings.

Throughout many of the responses, a common theme emerged that students wanted to be treated, as they see it, fairly. This was reflected directly by responses in the "fair" category and indirectly in many of the others. A "clear grading system" sets expectations up front in a fair way; and an "optional final exam" appears fair particularly to students who have met expectations throughout the course (i.e., higher-GPA students). Students also were motivated by being given choice and control. This was reflected in an "optional final exam," which gives students some choice in their education, as well as in the "variety of graded work," which provided them with a measure of control over their grades. Finally, juniors and seniors seemed to be motivated by "high expectations," whereas lower-rank students preferred "higher grading scales." Comments by respondents indicated that both of these factors motivate by encouraging students to study harder.

Experiences that are not motivating to students

To a degree, the students' responses about classroom experiences that do not motivate them reinforced the comments to other questions. "Long, boring lectures" was an overwhelming response as something that was not motivational, regardless of GPA or class rank, but notably for freshmen and sophomores, who tend to have more large-lecture classes. "No interaction or discussion" was cited as not motivating by higher-GPA students (>3.0), but it also appeared as

Table 4

Out-of-Class Motivators Grouped by Student Characteristics

Assignment Types by Rank	GPA Category	
	>3.0	<3.0
Seniors	1. Real-life assignments, relevant to profession 2. Hands-on 4. Fits material, applies to class 5. Prepares for exam 6. Frequent assignments	1. Real-life assignments, relevant to profession 2. Hands-on 3. Challenging
Juniors	1. Real-life assignments, relevant to profession 2. Hands-on 4. Fits material, applies to class 5. Prepares for exam 6. Frequent assignments	1. Real-life assignments, relevant to profession 2. Hands-on 3. Challenging
Sophomore	1. Real-life assignments, relevant to profession 4. Fits material, applies to class 5. Prepares for exam	1. Real-life assignments, relevant to profession 2. Hands-on 3. Challenging
Freshmen (no GPA)	1. Real-life assignments, relevant to profession 2. Hands-on 3. Challenging	
Grading Method by Rank		
Seniors	1. Fair 4. More often or weekly quizzes 5. High expectations, challenging 7. Clear grading system 8. Optional final exam	1. Fair 2. Partial and extra credit, reworks 4. More often or weekly quizzes 5. High expectations, challenging
Juniors	1. Fair 4. More often or weekly quizzes 5. High expectations, challenging 7. Clear grading system 8. Optional final exam	1. Fair 2. Partial and extra credit, reworks 4. More often or weekly quizzes 5. High expectations, challenging
Sophomore	1. Fair 4. More often or weekly quizzes 6. Variety of graded work 7. Clear grading system 8. Optional final exam	1. Fair 2. Partial and extra credit, reworks 3. Higher grading scale 4. More often or weekly quizzes 6. Variety of graded work
Freshmen (no GPA)	1. Fair 2. Partial and extra credit, reworks 3. Higher grading scale 4. More often or weekly quizzes	

not motivating for freshmen as well. "Lecturing straight from the book or overheads" also was mentioned as not motivating by most student categories. "Unfair grading" was mentioned by most student categories, reinforcing the comments about fair grading in an earlier question, but seemed slightly more important to higher-GPA and juniors and seniors.

Conclusions

As a qualitative study, numerous factors were identified in this study that would not have emerged with a strictly quantitative approach, but additional quantitative work would much more clearly identify the contribution of variables to motivational factors. Follow-up studies would be helpful in this arena.

The preference toward interaction and discussion was stronger for students of higher rank and higher GPA, who perhaps have more self-confidence in their knowledge and feel their contributions are valuable in the classroom; lower rank, lower GPA students were less motivated by this mode of teaching. This distinction should be considered in adoption of any teaching method that increases student participation, such as the cooperative learning methods.

It was interesting to note that the lower-GPA students were motivated by hands-on environments with more entertainment. This finding reinforces the idea that higher-GPA students are more internally motivated and lower-GPA students are more externally motivated in the classroom environment. The finding that lower-GPA students expressed preference for classes with fewer numbers of students may also relate to confidence.

Clearly, these students wanted assignments that provide real-life experiences and for instructors to help them see the tie between their assignments and professions. This may be even more critical for lower-GPA students, who may have more difficulty making connections between theory and practice. Hands-on activities may also help build this tie for the lower-GPA students. Higher-GPA students were motivated by class material that related to assignments and exams that resulted in grades. These students may be more results oriented, and grades are the most easily identified results. Fairness in grading, choice, and control all were cited heavily by the students in this study as motivational factors.

By acknowledging and addressing the factors that motivate students, as well as specific groups of students, an instructor can enhance learning by creating environments and opportunities that are inherently motivational for the range of student types found in typical agriculture classes. Clearly, no single teaching style, classroom environment, grading method, or assignment type motivates all students. However, students can be motivated or not by some decisions directly under the instructor's control.

The results summarized in this paper may help instructors focus on the motivational impacts of specific teaching, classroom, grading, and assignment techniques on different types of students. In essence, one method to help us become more motivational teachers of agriculture may be to ask students directly.

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Effects of Instructional Methodologies on Student Achievement, Attitude and Retention

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Abstract

The purpose of this study was to compare the effectiveness of two different methods of instruction for mathematics - the project-based experiential learning method and the traditional classroom method. The objectives focused on student achievement, attitude toward instruction, and retention of knowledge and skills.

The study was conducted over three months to include units of instruction in surface area and volume and coordinate geometry. Seven intact classes (95 students) at a private school in central Pennsylvania participated in the study. Students entered the study having demonstrated similar levels of prior performance.

Survey instruments were developed to assess students' attitudes toward the method of instruction. Commercially produced mathematics exams were modified to assess levels of student achievement.

The data shows that students taught through the traditional classroom method produced higher achievement scores immediately following the unit of instruction. Students taught through the project-based method of instruction had a greater level of retention as indicated by scores on the posttest taken three weeks after the last unit of instruction.

Students' attitudes toward instruction suggest that the sequence of instructional methodologies may have an affect on attitude. The first unit of instruction suggested that those students in the project-based method of instruction had a more positive attitude toward the method of instruction. The second unit of study indicated the traditional classroom method of instruction produced a more positive attitude toward instruction for those students involved.

Results of this study generally support previous research regarding the value of both the project-based and traditional classroom instructional methodologies. The study suggests that the value of these methodologies lies in the ability of instructors to combine the strengths of these strategies, from year to year, to best address their current student body.

Introduction

Teachers continually face the difficult challenge of providing a high-quality educational experience that produces a highly competitive, well-balanced, successful student while answering to public perception and increased professional demands. Published results of numerous local, regional, national, and international assessments keep our educational system under continual public scrutiny. At the same time, education continues to be the driving force to a sound economy and a society that is both prosperous and safe in the global community. This education does not come cheaply in terms of time and money needed to support its expected success.

Scholars have long searched for methodologies, strategies, and techniques that best enable the learner to take-in and utilize knowledge and skills. Fogarty (1999) identifies a number of "educational architects" that brought their philosophies and research to the forefront of the educational experience. Fogarty uses these researchers as a foundation for explaining that the design of learning must empower the learner to make meaning through the mindful manipulation of input. Caine and Caine (1991) explain that natural knowledge is not the equivalent of absolute truth. Hence, it is important for educators to continually push for an expansion of students' frames of reference.

The traditional classroom method of instruction is a familiar practice in many schools. Hiebert (1999) finds the traditional approach to solving problems in U.S. classrooms is to teach a procedure and then assign students problems on which they are to practice the procedure. Problems are viewed as applications of already learned procedures. This method of instruction allows instructors to cover a greater breadth of material in a shorter period of time (Buck Institute of Education, 1999).

John Dewey (1933) found that training with isolated exercises leaves no deposit, leads nowhere; and even the technical skill acquired has little radiating power or transferable value. It is not enough to learn from our experiences. What matters is how the experience is used (Caine and Caine, 1991). Project-based learning is an instructional methodology that promotes the use of experiences to develop new learning. The goal of a project is to learn more about the topic rather than to seek answers to questions posed by a teacher. Project-based learning is designed to be an integral part of the curriculum (Katz, 1994), where students receive a real or a potentially real problem and devise practical solutions from the research they do.

Purpose/Objectives

The purpose of this study was to compare the effectiveness of two different methods of instruction for mathematics. One was the project-based experiential learning method used in the Agricultural and Environmental Education program and the other was a more traditional classroom method of instruction. These two approaches were studied for their effects on student achievement, attitude toward instruction, and retention of knowledge and skills. Jacob (1984) relates Piaget's position that a key factor in the development of knowledge is physical experience, the interchange the child has with the physical environment. This research provides new knowledge that will aid in determining effective methods for planning and delivering instruction to students at Milton Hershey School.

The objectives of the study were to determine:

1. To what extent there is a difference in student achievement and retention test scores between students taught a unit of mathematics by a project-based experiential learning method versus a traditional classroom method of instruction in mathematics.
   a. Student achievement differences as indicated by unit test scores immediately following the individual units of study.

b. Difference in the extent of the retention of skills and knowledge as indicated by a long term posttest administered three weeks after the completion of the last unit of study.

2. To what extent there is a difference in the attitudes of students toward learning when taught by a project-based experiential learning method versus a traditional method.

Procedures

This study used a modified version of Campbell and Stanley's (1963) quasi-experimental counterbalance design for collecting data. The quasi-experimental design was chosen because subjects are required to complete multiple tasks and take multiple tests and were not able to be randomly assigned (Tuckman, 1999). Teachers, one male and one female, were selected because of their subject area expertise and their experience in using both traditional and experiential learning methodologies. Both teachers have more that ten years of experience teaching mathematics at this participating school and have worked cooperatively for several years.

The setting for this study was a private residential school, for at-risk children, in central Pennsylvania. All students come from a family with limited income and have at least average academic ability. The population consisted of all students (N= 95) enrolled in tenth grade geometry during the 1999-2000 school year. In order to ensure the groups were equal, participants were compared on gender, years at this school, and grade level. Performance of both groups was compared on accumulated grade point average (GPA), scores on a standardized mathematics performance test (CTPIII), and pretest scores based on information related to the units of study in this experiment.

Units of instruction were planned for surface area and volume and coordinate geometry. The project-based plans and the traditional classroom plans contained the same subject specific material to be covered. The first unit of instruction (surface area and volume) was taught in the traditional classroom method, using a page-by-page, explanation and practice approach to teaching. The project-based instructional approach to surface area and volume had students design, construct, and evaluate ice cream molds. The second unit of study (coordinate geometry) used a traditional classroom method similar to the one used for unit one. The project-based method directed students to design corn mazes using GPS (Global Positioning Satellite System) technology, to a designated degree of accuracy. A combination of classroom observations and audio taping were used to verify the levels of treatment for this study.

All students in the study were given a commercially produced geometry pretest (25 questions) two weeks prior to the first unit of instruction to establish a baseline level of performance for related subject matter. Immediately following a unit of instruction, all students were given a semantic-differential type of survey instrument to determine their attitude toward the instructional method. The attitude toward instructional method instrument was validated by a panel of five experts to determine its appropriateness for meeting the objectives of the study, readability, and for use with the intended age group. Reliability of this instrument was established with a Cronbach's Alpha of .86. Identical commercially produced unit tests for each unit of instruction in geometry were administered to all students following the attitude survey (20 questions for Unit I, 12 questions for Unit II). Two weeks after the completion of the last unit of instruction, the pretest was again administered to all students as a test to determine the level of long term retention. A set of interview questions was used to gather qualitative information from individual interviews with each teacher at the end of the study.

Data Analysis

The population for this study consisted of a census. Descriptive statistics were used to analyze the data collected. Means and frequencies were used to compare achievement data. The attitude toward instructional methodology data used means and standard deviations for comparisons. Range of scores, percentages and standard deviations comprised the techniques for analysis for the differences in retention of information between students participating in the different instructional methodologies. Content analysis of the interviews with teachers were used to analyze individual assessments of the methodologies.

Results

Participants' Characteristics: The participants were divided into two predetermined groups (Group I, Group II) based on the teachers to whom they were assigned. The students' characteristics were assessed to determine group comparisons with regard to gender, years at this school, grade level, accumulated grade point average, scores on a standardized mathematics performance test, and pretest scores. Group I had a higher percentage of females (61.0%) than Group II (48.1%). The majority of both groups have attended this school for three years or less (Group I – 63.4%; Group II – 57.4%) and over 90% of both groups were in tenth grade.

Performance results prior to treatment show similarities between both groups of participants. The accumulated grade point means (Group I - 2.53, SD=0.71; Group II – 2.70, SD=0.60) suggest similar performance in all subjects prior to the study. The standardized mathematics test mean scores (Group I – 348.4, SD=23.6; Group II – 348.6, SD=23.6) indicate comparable levels of performance on a nationally referenced examination. The pretest mean scores also show a similarity among the groups (Group I – 5.13, SD=2.20; Group II – 4.85, SD=2.10).

The demographic and performance characteristics of the participants indicate that the students entered this study with similar backgrounds and similar levels of performance. This would suggest that all students, individually and in groups, entered this study with similar opportunities for success.

Objective 1 - Student Achievement and Retention: The data collected show a higher level of achievement on the unit tests immediately following instruction for those students who were taught through the traditional classroom method of instruction. Table 1 shows that both units of instruction produced similar comparisons.

Retention of knowledge suggests a slightly different outcome. When comparing the percentage of gain or loss between the posttest and unit test scores for each unit of instruction, one finds a higher percentage of retention for students who were taught through the project-based method. Unit one showed an increase between the unit test scores and the posttest scores.

However, the increase was much higher for the project-based group (31.5%) compared to the traditional group ((7.41%).

Table 1

Mean Achievement Scores for Surface Area and Volume (Unit One) and Coordinate Geometry (Unit Two) by Project-Based and Traditional Classroom Methods of Instruction.

Unit of Instruction Method of Instruction	F	Unit Test Mean	SD	F	Post Test Mean	SD	Mean Score % Increase ↑ % Decrease ↓
Unit One							
Surface Area and Volume							
Project-based	40	5.63	2.45	36	8.22	2.73	31.5% ↑
Traditional	53	7.64	2.96	51	8.25	2.27	7.45% ↑
Unit Two							
Coordinate Geometry							
Project-based	53	2.26	2.00	51	1.71	1.66	24.3% ↓
Traditional	40	5.05	2.44	36	2.58	2.03	47.9% ↓

Unit two showed a decline in scores between the unit test and the posttest. The decline was much higher for the traditional group (48.9%) compared to the project-based group (24.3%). The first unit of study on surface area and volume used skills and knowledge that was more familiar to the students in this study because of past practice. The second unit of study on coordinate geometry was a more abstract concept and used skills and knowledge less familiar to the students in the study. One might suggest that this discrepancy in knowledge and skill base could account for the posttest scores being elevated for the more familiar subject matter and low for the less familiar material.

Objective 2 - Attitude Toward Method of Instruction: Table 2 shows student attitude toward learning was slightly more positive for the project group (M=18.53, SD=5.81) than for the traditional group (M=16.71, SD=4.90) for the same unit of study on surface area and volume. The reverse appeared in the second unit of study on coordinate geometry. The traditional group had a more positive value on their attitude toward learning (M=20.67, SD=5.30) than the project group (M=16.80, SD=5.26) for the same unit of study.

Conclusions

The research suggests that educational experiences which are relevant and meaningful are the most effective pathways to learning. The data from this study supports the literature to the extent that when students are able to develop a connectedness through real-life experiences, they are able to apply that learning to other situations. The higher achievement scores, as indicated by the posttest results, for the traditional methodology students immediately following the unit of instruction supports the research position of mastery of isolated skills and the development of knowledge to perform successfully on standardized tests (Buck Institute of Education, 1999). The greater percentage of knowledge retained, as indicated by the posttest results, by those students in the project-based experiential learning method supports the research of Dewey,(1933) Piaget (Jacob, 1984), Gardner (1999), Caine and Caine (1991), Hart (1983), and others and indicates that these students demonstrated the ability to use their experiences successfully over time.

Table 2

Group Mean Scores for Attitude Toward Learning

Unit of Study and Score by Method	f	M	SD
Surface Area and Volume			
Project	40	18.53	5.81
Traditional	52	16.71	4.90
Coordinate Geometry			
Project	51	16.80	5.26
Traditional	39	20.67	5.30

Note. Scores on the attitude instrument had a possible score range of 6 (most negative) to 30 (most positive). The theoretical midpoint was 18.

The data from the study do not indicate an advantage or disadvantage for either method of instruction as it relates to students' attitude toward the methods of instruction. The data suggest that those students who were first involved in the project-based experiential method of instruction had a more positive attitude toward the method of instruction than those students in the traditional method of instruction. However, this same group with the higher attitude toward method of instruction scores for the first unit of instruction also had higher scores toward the traditional method of instruction for the second unit of instruction. This would suggest that further research is warranted to determine the identity and control extraneous variables, such as the characteristics of the instructors and their familiarity with the projects, that may have influenced the results.

Implications

The role of the teacher is complex and continually changes. This study suggests that both the project-based and traditional classroom method of instruction show strengths that can be utilized for student achievement. The ability of teachers to coordinate the use of these methods of instruction to bring about the most positive educational results along with the most effective and efficient use of time holds an increasingly important place in the future success of the educational community. This implies: (1) a need to restructure the scheduling and curricular frameworks of the learning environment, (2) a staff development program preparing for broader interdisciplinary interactions, (3) a different approach to assessment, and (4) looking at agricultural education in terms of both an interdisciplinary conduit through which learning takes place along with its established role as a key career and technical opportunity.

Two innovations in the structuring of the school day, block scheduling and intensive scheduling, continue to be implemented in schools across the country. The focused blocks of class time and/or the concentration of classes in a semester would suggest an opportunity to combine the project-based and experiential and traditional methods of instruction for both improved instruction and student achievement. The results of this study would imply a greater chance for student success by taking advantage of teaching strategies that would address both the needs of the students for short term recall while building connections that increase their ability to retain and transfer their skills and knowledge. This combination builds on existing research that supports the mastery of isolated skills to develop knowledge that enables short-term performance (Buck Institute of Education, 1999) and the building of connectedness through real-life experiences (Caine and Caine, 1991; Hart, 1983; Dewey, 1933; Gardner, 1999).

Research has shown that the integration of science into the agricultural curricula can be a more effective way of teaching science (Balschweid, Thompson, and Cole, 1998). This study implies that the same opportunity for success may apply to other disciplines as well. However, this study suggests that the use of agricultural projects alone may not be as effective an instructional strategy as combining the more traditional strategies, where appropriate, with the project-based experiential component. The ability to experience and explore the application of this knowledge and skills provides valuable connections between what is known, what is learned, and why it is important.

Society is constantly in search of a magic, one size-fits-all solution. The complexity of individuals and environments does not allow for these types of solutions in very many situations. The educational community must continue to evaluate and search-out new and renewed solutions for success. This study indicates a positive value in the research that has preceded it and the hope for the application that lies ahead.

Recommendations

The limiting parameters of this study dictated that a quasi-experimental design be utilized. The study was also isolated to one institution and with a relatively small population. Therefore it is recommended that further study be done in related areas to compare the efficacy of the project-based experiential learning and traditional methods of instruction on:

1. the effect of gender as it relates to achievement using these two methodologies,

2. the effect of the students' learning styles on achievement as related to the two methodologies, and

3. the effect on achievement of these two methods of instruction when comparing agriculture and a variety of academic disciplines, i.e. language

arts, social studies, visual and performing arts, etc.

This study also suggests that both of the instructional methodologies used have advantages. It is recommended that further research into the advantages inherent in combining of these methods of instruction and the planning strategies that enhance a variety of educational needs and situations. Since this study only utilized a population of tenth grade students it is recommended that the aforementioned study include multiple levels of the K-12 educational experience.

This study did not indicate an advantage or disadvantage of either instructional methodology on the students' attitudes toward the method of instruction. The attitude toward instruction may reflect the overall composition of the group and/or the influence of the instructor. Further research is needed to investigate the degree to which the characteristics of the instructional group and the instructor influence the attitude toward instruction when involved in the project-based experiential and traditional methods of instruction.

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Strengths and Weaknesses of Peer Evaluation of Teaching in University of Florida's College of Agricultural and Life Sciences: A Five-Year Review

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Abstract

This five-year follow up study was conducted to assess the peer evaluation process in the University of Florida College of Agricultural and Life Sciences. The long-interview process was used with faculty who were peer evaluated, faculty who chaired peer evaluation committees, and administrators who interpreted the results of the peer evaluations. Content analysis was used to interpret the interviews. Results of the interviews were triangulated to identify common themes among the groups involved in the process. The interviewees cited the time necessary to complete the peer review process and the reluctance of peer evaluation committee members to include less than positive feedback in the final report as shortcomings of the process. However, the three groups agreed that peer evaluation has improved teaching, and recommended that peer evaluation be continued in the College of Agricultural and Life Sciences at the University of Florida.

Introduction

Land grant institutions in the United States have included teaching as a component of their tripartite mission (research, teaching, and extension) since their inception. Until recent years, however, excellence in teaching has seldom been rewarded. Due to public perceptions of poor teaching and pressure from state and federal government leaders, the teaching role at universities has been magnified (Rudd, Baker, & Hoover, 1996). Universities are struggling to identify and reward good teaching.

Although student evaluations of teaching are both praised and criticized, assessing teaching effectiveness is largely accomplished through this means (Keig & Waggoner, 1994). Soderberg (1986) stated that when evaluating teachers at the delivery phase of instruction, students are the most qualified to accomplish this task (1986). On the other hand, students may not be qualified to assess teaching during revision and pre-interactive phases (Keig & Waggoner, 1994). Therefore, student evaluations, while they do contribute information on teacher effectiveness, may not provide a complete portrait of all aspects of teacher performance.

Kronk & Shipka (1980) define evaluation as "appraising the quality, worth, or effectiveness of an individual's work" (p.7). Peers, students, administrators, or the faculty members themselves may conduct the evaluation. Willerman, McNeely, & Koffman (1991) refer to a process of peer observation and assistance as a method of one teacher helping another teacher to improve his or her classroom performance. Keig & Waggoner (1994), define peer evaluation as "a process in which faculty work collaboratively to assess each others' teaching and to assist one another in efforts to strengthen teaching" (p. iii). According to Lieberman (1998), peer evaluation is understood to include all procedures used by teachers to improve teacher performance and to terminate teachers who are not performing adequately after receiving this assistance.

Teacher evaluations are important, because they are a major consideration for promotion and tenure decisions (Osborne, 1998). Although student evaluations are still the main data source for evaluating teaching, the use of peer evaluations is growing (Osborne, 1998). More universities are incorporating peer evaluation as evidence in faculty evaluation. Centra (1979) stressed the importance of peer evaluation in assessing teaching, because it provides a different perspective than that of the student or supervisor for evaluation. "Faculty can evaluate their colleagues' performance at three stages of instruction: pre-interaction, delivery, and post-interaction" (Keig & Waggoner, 1994). They can also define relationships among these stages and the following processes: goals and objectives, methods and materials, and feedback. (Soderberg, 1986).

Keig & Waggoner (1994) argue that faculty evaluations are an important part of improving teaching. Successful teaching requires more than just a knowledge of the subject matter; it requires knowledge of learning theories and teaching strategies, dedication to students' advancement, awareness of the environment in which teaching and learning occurs, and concern about their teaching as well as their colleagues' (Keig & Waggoner, 1994). Gould (1991) concluded that peer evaluation, student evaluations, and self-evaluations are all valid forms of assessment and all have strengths and weaknesses.

Peer Evaluation at Other Institutions

The University of Kentucky Community College System (UKCCS) implemented a Teacher Consultation Program (TCP) in 1977 (Kerwin & Rhoads, 1996). A study conducted over three semesters within the UKCCS system, showed that faculty who participated in the TCP raised their student evaluations significantly when compared to the control group of faculty who did not participate in the program (Kerwin & Rhoads, 1996). One semester after participation, those instructors still had higher ratings on student evaluations. In addition, participating instructors applauded the program as being helpful to them as instructors (Kerwin & Rhoads, 1996).

The peer review committee at the University of Tennessee, Knoxville, made the comment in its 1987 final report that peer evaluation should be used to evaluate the faculty member's knowledge of the subject, course objectives, assignments, examinations, and contribution to the departmental teaching efforts (Bell & McClam, 1992). The University of Tennessee peer evaluation process included the participation of the instructor being evaluated by collecting a variety of course material including syllabi, assignments, tests, and written materials. The review team (consisting of a three-member group of tenured faculty) evaluated the portfolio and provided a written summary of the evaluation to the instructor. Other types of evaluation (such as classroom visitation) were optional and each department decided what would be appropriate for faculty within the unit (Bell & McClam, 1992).

Peer Evaluation at the University of Florida

In 1993, the University of Florida Teaching Improvement Committee recommended to President John Lombardi that colleges and departments within the university develop mechanisms for extensive documentation of instructional quality by adopting the use of teaching portfolios. Once implemented, this system would provide a diversity of information for teaching quality evaluation for the purposes of teaching recognition, improvement, and tenure and promotion decisions (Connor, 1994).

In July 1994, the College of Agricultural and Life Sciences faculty voted to include peer evaluation as a required and essential component for tenure and promotion. The original purpose of peer evaluation was to improve teaching and to provide input about the quality of teaching. The College of Agricultural and Life Sciences called on the UF/IFAS Teaching Resource Center (TRC), located in the Department of Agricultural Education and Communication to develop a suggested plan for conducting peer evaluations. The suggested plan was based upon models from the University of Nebraska - Lincoln, the University of Kentucky, and the University of Tennessee - Knoxville. Based on the review of peer evaluation policies from other institutions of higher education, Rudd, Baker and Hoover (1994) identified three areas of concentration for review in the peer evaluation process. The areas reviewed were classroom instruction, curriculum development and improvement, and course development and improvement. Although the TRC developed suggested guidelines for the College, each department developed their own peer evaluation policies. Departments were encouraged but not required to use the TRC format. The College of Agricultural and Life Sciences made further revisions to the process in 1997 by reducing the number of peer evaluations for promotion and tenure decisions.

In general, the peer evaluation process in the College of Agricultural and Life Sciences at the University of Florida is structured as follows. When a faculty member desires to be peer evaluated, the peer evaluation is scheduled through the department chair. The faculty member decides the course to be evaluated. The peer evaluation is scheduled to allow committee members to observe the course for one semester. The committee is usually composed of three faculty members. It is recommended that one member be selected by the faculty member being evaluated, one by the department chair, and one jointly. Typically, one member of the committee comes from another department. The department chair selects the peer evaluation committee chair from among the members of the committee.

Faculty members in line for promotion and /or tenure are required to be peer reviewed, at least once before the promotion and/or tenure decision. A faculty member may elect to be peer reviewed more than once. In addition to promotion and tenure decisions, teaching awards in the college require a peer evaluation of the faculty member in order to be considered for recognition. The teaching awards range from teacher of the year recognition to the Teaching Incentive Program (TIP) awards that add $5,000 to a faculty members' base salary.

Problem

The use of peer evaluation has grown in popularity and it is widely used to help administrators assess faculty teaching. This evaluation method has been widely employed to make promotion and tenure decisions as well as to decide faculty merit in teaching programs. Although the use of this methodology is increasing, little has been done to assess the effectiveness of peer evaluation.

The purpose of this study was to critically examine the peer evaluation process in the University of Florida's College of Agricultural and Life Sciences and to determine the effectiveness of peer evaluation over the last five years in the opinions of the department chairs, peer evaluation committee chairs, and the faculty who were peer evaluated. The following objectives guided this study:

1. Determine the perceptions of department chairs toward the peer evaluation process
2. Determine the perceptions of peer evaluation committee chairs toward the peer evaluation process
3. Determine the perceptions of faculty who were peer evaluated toward the peer evaluation process
4. Determine common themes among department chairs, peer evaluation committee chairs, and peer evaluated faculty in their assessment of the peer evaluation process.

Methodology

This study was descriptive and qualitative in nature, utilizing the structured long interview process (McCracken, 1988). The final interview questionnaire consisted of 8 questions. Faculty in the Department of Agricultural Education and Communication reviewed the instrument for trustworthiness. The interview questionnaire was pilot tested with a group of faculty representing those who were peer evaluated, those who chaired peer evaluation committees, and department chairs. As a result of the pilot test the interview questionnaire was slightly modified. The interviews were completed by the researchers. To ensure consistency in the interview process, the interviewers were trained by the lead researcher.

The goal of this qualitative study was not to produce a standardized set of results but rather to produce a coherent description of the status of peer evaluation in the College of Agricultural and Life Sciences at the University of Florida.

The target population was all University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) College of Agricultural and Life Sciences Departments (17). Interviews were conducted with Department Chairs from each department in the College, a chair of a peer evaluation committee from each Department, and a faculty member who was peer evaluated in each Department. A total of 45 out of the 51 selected chose to participate in the interview. Content analysis and triangulation were the methods to interpret the interviews.

Results

Perceptions of department chairs toward the peer evaluation process.

According to one chair, "Peer evaluations are conducted to achieve and maintain excellence in teaching in academic programs, and for TIP awards, promotion and tenure," a sentiment echoed by many of the chairs. In fact, almost all of the department chairs interviewed indicated that peer evaluation is used primarily for promotion, tenure, and awards. Although not as prevalent, an additional theme suggested that the purpose of peer evaluation is to improve and maintain the quality and excellence of teaching. The chairs believed that teaching has improved in the college as a result of peer evaluation. The chairs cited that an unexpected side-benefit of peer evaluation was the peer evaluation committee learned from those being evaluated.

When questioned about key concepts that should be used as criteria in peer evaluation, department chairs generated a substantial list. Most chairs agreed that organization and preparedness were the most important criteria. The chairs stated that subject matter knowledge, current/appropriate curriculum, and course content are also important considerations for peer evaluation. Rapport with students, using a variety of teaching methods and clear/effective delivery were also viewed as components of good teaching. College department chairs cited student interest, and clear/fair expectations as factors that influence teaching.

Department Chairs believed that peer evaluation within IFAS is responsible for positive results including: instilling pride in teaching and increasing emphasis on teaching. As one chair stated, "You cannot attribute it all to peer evaluation, but in the last ten years teaching at the University of Florida has become very important." Another chair stated that, "There has been a change in culture, teaching has become more important and peer review is a part of the return of pride and attention to teaching." Yct another chair echoed ". . . .there is an emphasis on teaching, which we haven't seen in years (which) is reinforced through peer evaluation. "

Department chairs indicated that the time required to complete the peer evaluation process was the greatest barrier to conducting the evaluations. The department chairs also felt that committees were reluctant to share negative feedback for fear of damaging colleagues' case for promotion, tenure and teaching awards. While some department chairs felt that peer evaluators may be too critical in their assessment of faculty this was not a major theme.

Several department chairs concurred with a colleague who suggested "the poorest teachers have not been evaluated". There was a concern that the teaching faculty that needed the peer evaluation process the most were not being evaluated. In fact, department chairs believed that peer evaluation should be mandatory for all faculty members.

Department chairs indicated that the peer evaluation is but one evaluation tool they use in assessing faculty teaching. Student evaluations, teaching assistants, graduate and undergraduate coordinators are all considered additional sources of information to evaluate teaching.

Perceptions of peer evaluation committee chairs toward the peer evaluation process

The prevailing theme derived from those who chaired a peer evaluation committee suggested the main purpose for conducting peer evaluations was to provide evidence for promotion, tenure and awards. The committee chairs felt as if their job was to simply provide evidence for the promotion and tenure decision or teaching awards. "How can we improve the learning environment and (student) learning? This is not the ultimate goal of the process." One committee chair said "Accountability" was the main role of the committee.

A smaller proportion of committee chairs indicated that the purpose for peer evaluation was to improve and maintain the quality and excellence in teaching. A major theme from this group was that the committees not only benefited by learning new techniques but also from exposure to unique ideas from those being evaluated. Committee chairs shared statements such as, "It is very unusual to see other faculty/your peers teach. This has improved my teaching;" "Committee participation makes you think about your own teaching;" and "peer evaluation forces folks to look at what they are doing." Although teaching improvement was not considered the main purpose of peer evaluation among committee chairs, teaching improvement was thought to be the major benefit of the process.

The committee chairs identified five key concepts as important for evaluating teaching. The concepts identified were interaction with students, course content, course materials, clear/effective delivery, and clarity of presentation.

Committee chairs identified both the amount of time it takes to conduct a peer evaluation, and the reluctance to use negative feedback as major weaknesses of the peer evaluation process. One committee chair asked, "If they (evaluations) all come back glowing, is the process any good?" Another committee chair said, "Everyone does a great job in the classroom - the way they (evaluations) are used is not beneficial. Most of the constructive (negative) feedback is verbal." Still another chair stated, " There is a reluctance to put down negative comments on paper--you don't get an honest report."

A minor theme from the peer evaluation chairs was that peer evaluation committees feel that faculty do not know the science of teaching, and are not trained as teachers. Committee chairs believed that more pedagogical skill improvement was needed. One committee chair stated that, "Most faculty haven't been educated and trained as teachers."

One positive quality of peer evaluation identified by the chairs was that the process gave them the opportunity to provide feedback (both positive and negative). The committee chairs interviewed felt that teaching has improved and that teaching will continue to improve as a result of peer evaluation in the College of Agricultural and Life Sciences. One committee chair said that "There are a combination of things happening in the college-change of funding, renewed emphasis of the value of education and instruction, Professorial Excellence Program (PEP) and the Teaching Incentive Program (TIP) awards (both awards come with a substantial raise in the faculty members base salary): suddenly people see the value in teaching."

Perceptions of faculty who were peer evaluated toward the peer evaluation process

Participants in the peer evaluation process believed that the feedback from peers was valuable. In particular, the faculty who were evaluated appreciated feedback from experienced members of the peer evaluation committee that helped them to improve teaching. A benefit, according to one individual was that the evaluation included input by someone who has been recognized as a TIP award winner. As a whole, the faculty who were evaluated made changes to improve their teaching. Faculty shared comments such as, "(Peer evaluation) allowed me to see what the class looks like from another perspective," and "Peer evaluation serves to enhance the learning environment for students." Those evaluated viewed the purpose of peer evaluation as two-fold. First it provided input to improve and maintain the quality and excellence of teaching. Second, it provided evidence for promotion, tenure, and awards.

Faculty members who were evaluated believed the peer evaluation process has improved teaching in the college. One faculty member that was peer evaluated said peer evaluation, "gets people talking, gets dialogue and interaction going, and allows for faculty to see what others are doing. The process is a benefit." Another faculty member mentioned there is "not a lot of talk about teaching - (peer evaluation allows you to) interact with folks with teaching themes."

Individuals that were peer evaluated hope that committee members will look for key concepts such as organization, clear/fair expectations, communication of what is expected, and communication of concepts when evaluating their teaching.

Negative aspects of peer evaluation, according to those that were peer evaluated, include the reluctance to use negative feedback due to promotion, tenure and awards. One individual said, "If (peer evaluation is) used for TIP, it is not a true reflection of teaching." One individual interviewed felt there were no benefits, no changes as a result, and that peer evaluation "confirmed my belief that the system does not work. We are not enforcing the true meaning of what the institution is intended for. We are encouraging mediocrity, and promoting a non-productive system."

Two suggestions for making changes in peer evaluation were made by those who were peer evaluated. The first suggested change was to separate peer evaluation from promotion and tenure. The second suggestion was to use an outside evaluation team, including professional teachers and/or blind reviewers. As one individual stated, "The reviewers themselves are not professional teachers trained in pedagogy." Another teacher said we are basic scientists, with little or no formal training, and many have a lack of respect for this." Still, another person who was peer evaluated felt that, "Changes are needed in assessment and the reporting system, we are receiving college wide evaluation inflation – people are reluctant to provide criticism because of promotion and tenure."

The faculty who were peer evaluated suggested that the long-term impact affecting their respective departments will be that peer evaluation will improve the quality of teaching. Those who were evaluated also felt that teaching is more widely recognized as a valuable effort in the institution. One faculty member stated that, "It (peer evaluation) has created a college-wide awareness that teaching IS important and not just a chore." Other faculty member's comments include, "We are far better off with peer evaluation, for the students, the improvement of teaching " and "Peer evaluation is part of an overall emphasis of improving teaching."

Common themes among department chairs, peer evaluation committee chairs, and peer evaluated faculty in their assessment of the peer evaluation process.

The researchers utilized triangulation to analyze the data. The following common themes were identified among the three groups. The participants believed that the primary purpose of peer evaluation is to provide evidence for promotion, tenure, and teaching awards. The feeling that the peer evaluation process has improved teaching in the college was a major theme in each group. In addition, each group believed that the continued use of peer evaluation in the college would improve teaching. These improvements occur not only in the faculty being evaluated but also in the faculty conducting the evaluation.

All three participant groups stressed two major negative aspects of peer evaluation. First, time was considered to be a major constraint. Although the participants agreed that the peer evaluation process held major benefits, the amount of time required to complete the evaluations is a deterrent. All groups cited the reluctance of committees to use negative feedback because of promotion and tenure, and award implications. The groups felt that this is a major problem and that the peer evaluation results were clouded as a result of this practice.

Discussion

All groups involved with the peer evaluation process agreed that peer evaluation improves the quality of teaching. The use of peer evaluation should be continued and enhanced in UF/IFAS College of Agricultural and Life Sciences. The overriding perception that peer evaluation is used primarily for promotion, tenure, and awards needs to be addressed. Why does this perception exist? What are the perceptions of those outside of the peer evaluation process?

All groups agreed that teaching improved as a result of peer evaluation. They agreed that teaching improved not only for the faculty being evaluated, but also for the faculty serving on the evaluation committee.

The amount of time spent for peer evaluations is a major concern. The most qualified teaching faculty are being taxed by serving on too many peer evaluation committees. Perhaps faculty that are not the best teachers could be utilized on committees where they could work with committee members who are "master teachers." This would serve not only the person being evaluated but also faculty who are a part of the evaluation process. Departmental policies need to be evaluated for efficiency. Faculty and administration need to determine if the benefits outweigh the time costs.

All groups were concerned that the faculty who could benefit most from peer evaluation are not being evaluated. Currently, faculty are evaluated once before being promoted to associate and full professor and if they apply for a faculty teaching award. Given the benefits of peer evaluation cited in this study, perhaps the College of Agricultural and Life Sciences should explore options that would encourage (or even require) all teaching faculty to be peer evaluated.

The reluctance of committees to use negative feedback weakens the peer evaluation process. Non-punitive peer evaluations may be in order. Perhaps other, less invasive tools for improvement of teaching should be used before being peer evaluated.

Discrepancies existed between the department chairs, committee chairs and faculty who were peer evaluated as to the criteria for evaluating teaching. More preparation in pedagogy is needed for peer evaluation committees. Better communication of expectations between the department chairs, committee chairs, and the faculty member being evaluated is needed. Peer evaluation policies need to be examined for clarity and validity.

As a result of this study the researchers recommend that the College of Agricultural and Life Sciences at the University of Florida continues to utilize peer evaluation for the purpose of improving instruction and as a tool for evaluating faculty teaching. Further study is recommended in the area of peer evaluation to determine the impact of peer evaluation on the teaching and learning process.

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Proceedings

National AAAE Poster Session
American Association for Agricultural Education

Chair:

Dr. Jeff Moss
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Agriculture in a Global Context: Innovations in Multidisciplinary Experiential Learning in Undergraduate Education

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Colleges of Agriculture provide outstanding discipline specific undergraduate and graduate programs that provide students with comprehensive technical skills. Through strong liberal arts requirements, they also enable students to obtain broad-based general college educations. However, they typically do not provide students with capstone multi-disciplinary and global perspectives on the industries in which they intend to establish their careers. Thus there is a compelling need for Colleges of Agriculture to develop educational programs that meet these important needs.

The *Agriculture in a Global Context* project has four important innovative dimensions. First, it represents a College of Agriculture wide initiative to give students capstone course experiences that integrate knowledge from several disciplines to provide them with a comprehensive multi-disciplinary and global perspective of agricultural industries. Second, it emphasizes experiential learning throughout the entire course curriculum. Third it utilizes distance learning technologies and faculty teaching teams to enhance collaboration between a traditional land-grant institution and 1994 land grant institutions. Fourth, it enhances the quality of agricultural higher education available to Native American communities.

Program Phases

At the request of the Dean of the College of Agriculture at Montana State University, faculty in the departments of Plant Sciences, Land Resources and Environmental Sciences, and Agricultural Economics developed as a pilot project a senior level capstone course. *Follow the Grain* focused on the cereal grain industry from variety development to the consumer in the Pacific Rim, and was taught in the Spring of 1999 as a cross listed senior level seminar course open to all majors. The success of this course spurred faculty to develop the *Agriculture in a Global Context* proposal (which was funded by the USDA Higher Education Challenge Grant program) to establish other international agriculture courses. The courses offered through this project (1) are multi-disciplinary, (2) focus on the importance of the sciences, economics, education, and business to the agriculture industry, and (3) provide students with experiential learning opportunities in the laboratory, in field experiments, on the farm, in rural communities, and in domestic and international distribution, processing and marketing. The following three courses were developed and offered during the 2000-2001 school years:

(1)*Follow the Grain*, a senior level multi-disciplinary seminar course examining the small grains industry, from bench science to international marketing;

(2)*From Gate to Plate*, a junior/senior level multi-disciplinary course examining the beef livestock industry from bench science to international marketing;

(3)*Agricultural Science and Economic Development among Limited Resource Farmers*, a junior/senior level course examining the contributions of the agricultural sciences and social sciences to enhancing productivity and economic development among limited resource farms in the United States and other Western Hemisphere countries. This course utilizes the Participatory Rural Appraisal (PRA) process to evaluate challenges and opportunities in rural communities.

Progress has been made on the second objective of enhancing collaboration in education between traditional land-grant institutions and 1994 land-grant institutions. The State of Montana has seven 1994 land-grant institutions. Each of the three courses has been offered to students at two of the seven 1994 land-grant institutions – Ft. Peck and Dull Knife Memorial College. This has been accomplished through the use of distance learning technologies available through the Burns Technology Center at Montana State University - Bozeman and at both tribal colleges.

Results

There are three substantive national educational impacts of this project to date. (1) Three innovative model multi-disciplinary courses have been developed for junior/senior level undergraduates that provide comprehensive perspectives on the relevance and role of agricultural sciences and social sciences in major agricultural industries. (2) Effective models have been developed for the collaborative development and delivery of advanced undergraduate agricultural science and social science courses between traditional and 1994 Land Grant institutions. (3) Collaboration between instructors from different science and social science departments in team teaching undergraduate courses has been achieved using effective models. These models are available for review at the project web site aginternational.msu.montana.edu and demonstrate the potential of multi-disciplinary curriculums and their effectiveness.

Future Direction

Students can be reluctant to participate in new offerings that include the expense associated with international travel. Instructors must actively recruit students who would benefit from the experience, allowing for adequate lead time to raise the funds required for the trip. A greater marketing effort would attract students from across the college that might not be familiar with the instructor(s).

One Montana Agricultural Education instructor enrolled in the Limited Resource Farmers course. The instructor stated that the course and international experience was invaluable and beneficial to him as a secondary educator. Future plans include offering an international course and travel experience for secondary agricultural educators, which will provide them with the knowledge needed to incorporate international components into their curriculum.

Cultural issues can have a profound impact on consumer buying patterns. *Agriculture in a Global Context* courses should include a larger cultural and language component to adequately prepare students for the international portion of the course. In turn, this better prepares them to be "global-ready" graduates.

The success of the three courses has spurred interest from other College of Agriculture instructors to develop experiential learning opportunities. A clearinghouse needs to be develop to facilitate the development of new experiential courses and assist instructors with the complexities of group international travel.

Animal Sciences Education Design Team: A Partnership Providing Web-Based Instructional Resources in Livestock and Meat Evaluation

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One of the goals of the Florida Cooperative Extension Service is to identify problems and issues faced by teachers, agents, and leaders throughout the state. Once these issues have been identified, they are classified as a State Major Program and a design team is formed to address them (http://extensionsmp.ifas.ufl.edu/). Design teams exist as partnerships between extension specialists, university faculty members, extension agents, agricultural science teachers, and industry representatives. FL 711- Animal Sciences Education is the design team dedicated to, among other things, determining the needs of youth animal science education programs, both formal and informal, and provide teachers, agents, and volunteers with curriculum and instructional resources to teach youth about animal sciences (http://extensionsmp.ifas.ufl.edu/fl711.htm).

The quality of instruction provided by agricultural science teachers, extension agents, and volunteer leaders is directly related to the instructional materials for which they have access. A major issue identified by the design team was the lack of quality instructional resources in the area of livestock and meat evaluation that teachers, agents, and volunteers could utilize easily, efficiently, and effectively. Varrella (1989, p. 20) stated, "...there is a wealth of instructional material available to use that will serve many of our needs, if we can only access the material effectively and use it efficiently." Since numerous high-quality resources related to livestock and/or meat evaluation are already available on the World Wide Web, design team members decided to create a web-based resource for use by their clientele. The design team identified two primary goals of this web-based resource:

1. To identify sources of information on livestock and/or meat evaluation that could be used effectively to teach animal science related information to youth.
2. To make such sources of information readily available to teachers, agents, and volunteer leaders throughout the state as efficiently and effectively as possible.

Methodology

The first step in creating this web-based resource was to decide what topics to include. The authors decided to include sections on: terminology, live animal evaluation, carcass evaluation, meat judging, live evaluation practice, and other interesting and useful links. Once the components to be included in the resource were identified, the primary author located high-quality sites currently available on the World Wide Web.

For the live evaluation practice section, the authors took pictures of all the live cattle and hogs used in the Livestock and Meat Evaluation class at the University of Florida during the spring semester of 2001. Once animals had been evaluated live, they were processed and carcass data were collected. Pictures of side and rear views of each animal are included as well as the complete set of carcass data for each animal. This allows users the opportunity to practice their live evaluation skills and then check for accuracy by comparing their estimations to the actual carcass data.

Prior to being assigned a permanent web address, the website was viewed by all members of the design team to check for accuracy and to ensure that the resource accomplished the goals set by the design team. Once approved by the design team, the website was assigned a permanent address and promoted throughout the state.

Results

The web-based resource is currently available to teachers, agents, leaders, and any other interested individuals through a link on the University of Florida Department of Animal Sciences Youth Programs Homepage. Interested individuals who have contacted the design team have been given the web address.

It is the hope of the authors that many teachers, agents, and volunteers throughout the state will utilize this resource in a variety of ways. The resource is designed to be used not only to train competitive event teams, but also to integrate the concepts and skills of live animal and meat evaluation into formal and informal educational activities.

Future Plans

The authors' plan to continue to add resource links, additional live animal pictures and carcass data, as well as a new section on carcass evaluation practice to the resource in the future. Each spring semester, the authors plan to take pictures of all of the live animals used in the Livestock and Meat Evaluation class as well as pictures of the carcasses to be added to the website. The authors will also make necessary changes to the website based on user comments as more and more individuals use the resource as part of their instructional resources.

Costs

In terms of costs, the time and effort of the primary author was the only cost associated with the initial development of this web-based resource. Future costs may include monetary compensation to future individuals contributing to the maintenance of the resource.

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"Austin… we have a problem!"

Doug Ullrich, Sam Houston State University
Dan Hubert, Utah State University

In the distant past as in the present, the management of the diverse Agricultural Education facilities has fallen to the teacher(s) in that program. Since the late 1980's there has be little or no systematic state-wide effort to review or inspect Agricultural Education facilities. This is due in part to the philosophical change in the Texas Education Agency (TEA) during the 1980's during which "local control" and reduction in TEA administration costs became a major focus.

Before the philosophical change the Texas Education Agency Department Agricultural Education had approximately 18 staff members, ten of these were Area Coordinators and these individuals visited programs consistently. Part of the "visitation" included a review of equipment, facilities, and maintenance procedures.

During the past fifteen or more years these duties have fallen to the administrators of the local campuses. Most of these administrators have no experience in Agricultural Education or Career and Technology Education. Furthermore, most universities in Texas no longer require a Career and Technology or Vocational Education class to receive a principal or superintendent certificate.

Methodology

A stratified random sample of 100 Agricultural Education programs in Texas was selected from the Vocational Agriculture Teachers Association of Texas (VATAT) database of Agricultural Education programs. Ten schools were selected from each of the ten VATAT / FFA areas which created a geographic randomness. To further randomize the sample according to school district size, two schools from each of the five different University Interscholastic League (UIL) classifications were selected within each area.

The researchers developed an instrument from a review of the literature. The objectives of the study required that the data be collected on site by direct observation. Two schools were selected for review in the Tyler area so the researchers could refine the instrument and expectations to each of the items on the instrument.

Each of the schools Agricultural Education Teaches as well as the school administration was contacted concerning participation in the study. The four researchers personally visited and reviewed 94 of the selected schools during the spring and summer of 2000.

This poster will illustrate with pictures and charts the concerns found by the researchers.

Results

The review of facilities gave the researchers an overall impression that the teachers have in general failed to create a positive safety climate within their facilities. The majority of the facilities were neat and orderly but many had major safety concerns including poor arrangement of equipment, improperly stored supplies, improper floor markings, few updated safety signs, poor lighting, improperly marked exits, nonworking fire alarms and improper storage of combustible wastes.

There were concerns with the quality and quantity of personal protective equipment available for use by the students. These include safety glasses, clothing, shields, gloves, respirators, earplugs, respirators, goggles and steel-toed boots. Furthermore, the vast majority of facilities did not have an eyewash nor an emergency shower.

Inadequacies with tools and equipment also existed in that many of the guards and shields for moving to protect students from moving parts were missing or inoperable. Discrepancies in commonly used procedures and repairs to welding, cutting and brazing equipment were identified, as well as, major concerns with electrical, compressed air and environmental safety within these facilities.

Preliminary results indicate that many of the safety concerns could be corrected with little financial burden on local school districts. The most serious concerns were in the span of control of the teacher and with modification of the administrative procedures many of the most common concerns can be mended. These concerns ranged from shop cleanliness, storage, misuse of tools, equipment arrangement, tool room management, chemical and solvent storage and methods of teaching safety.

Recommendations

1. Workshops should immediately be developed for administrators and agriculture teachers concerning safety expectations in Agricultural Education Programs.

2. A manual to help administrators and agriculture teachers identify proper facility organization, equipment arrangement, supply storage, personal protective equipment, electrical safety, environmental controls, compressed air, fire concerns, combustible storage and general shop safety should be developed.

3. Pre-service teacher programs should immediately address safety issues and expectations within agricultural education facilities.

4. This study should be repeated in Texas and other states in an effort to continuously and systematically develop a state-wide and nation-wide.

The researchers understand the reluctance of teachers and state staff to bring attention to the concerns addressed by this and similar studies. Much of the reluctance is derived from the fear that schools will close programs or no longer offer laboratory based classes. Although this is a valid worry the Agricultural Education family cannot allow these concerns to alter our moral and legal obligation to the our students.

Building a Magnet School Network in Rural Communities

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Introduction

Maintaining rural community economic viability, schools, and retaining youth are concerns for many rural areas. The current population shift from rural to urban areas is compounding the issue. One means of keeping young people and adults in rural communities and encouraging people to move from urban to rural communities is to provide high quality, relevant, affordable educational programs on demand. The Mead Agricultural Sciences Magnet School, the first rural magnet school, was created to fill such a void. Now in its third year of operation, the rural agricultural sciences magnet school concept is being incorporated into three other communities.

The purpose of building a rural community magnet school network is to increase the number of young adults living, employed, and investing in rural areas. The objectives are to: (1) incorporate the magnet school model of the Mead Agricultural Sciences Magnet High School into three other communities; (2) design new curricula and redesign existing curricula for distance delivery and compatibility with the four schools and communities; and (3) assess the success of the network for adaptation into other rural communities interested in revitalization.

Program Development

The Mead Agricultural Sciences Magnet School has been in operation since the 1999-2000 academic year. Prior to its inception, the school board and administration were faced with cutting programs and teachers due to declining student enrollment, a state mandated tax lid on school spending, and falling agricultural commodity prices. People in the community were concerned about the survival of their small school. Teachers were concerned about losing their jobs. Parents were concerned about sending their children to schools that may not have the same high academic standards. Schools are the heart of many rural communities, and when their existence is threatened, community members tend to rally around ideas that will keep the doors open.

Several saw an opportunity to work collaboratively with the University's Agriculture Research and Development Center (ARDC) to help "keep students in Nebraska" and involved in the agricultural industry. An administrator explained, "the main goal in terms of the district was to provide an agricultural education program for our students that would prepare them to go into the immediate agriculture industry. (A) Secondary goal was to keep the school open." (Moody & Bell, 2001).

The school district and ARDC were granted seed money from Nebraska Network 21 to study the feasibility of creating an agricultural magnet school (NN21 News, 1998). Administrators, board members, teachers and students visited existing agricultural magnet schools and non-traditional agricultural education programs as well as attended national conferences on educational reform efforts.

During the 1998-99 school year, a student interest inventory was conducted. From this interest inventory, four career pathways were identified: agricultural technology, plant science, agribusiness, and food science. Animal science was identified as another pathway.

Resources

Several key factors in this transformation were: succinct values, broad involvement, collaboration, communication, leadership, resource availability, and a shared vision and subsequent action planning and implementation. Mead had the commitment from the ARDC, school board, and community members and businesses. Also they partnered with university faculty in planning and creating curriculum and programs. External funding from NN21 funded a biotechnology curriculum project, the catalyst for discussion and partnering for a magnet school. NN21 seed money was used to study the feasibility of implementing a magnet school into an existing educational structure. Pioneer Hybrids, and community and small businesses have funded supplies and provided facility updates. A W.K. Kellogg Foundation grant has been instrumental in extending the agricultural sciences magnet network to three additional schools.

Lessons Learned

1. Sense of urgency. To prompt change, a sense of urgency must be created (Nahavandi & Malekzadeh, 1999). In this case, the urgency will prompt change if attached to core values.
2. Community Vision. A community vision requires leadership that empowers those affected to have input in the decisions creating the ultimate vision (Yukl, 1998).
3. Communication. Constant communication articulating the vision of change removes doubts that may surface as the organization proceeds.
4. Program planning and evaluation. Implementing program planning and evaluation allows the school to document its effectiveness and success stories.

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Capstone Experience:
The Key to a Successful Agricultural Communications Program

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Introduction

Undergraduate students who major in agricultural communications complete courses from a variety of disciplines including areas outside of agriculture. At times, their courses may seem unconnected to each other and unrelated to their ultimate career goals. A capstone course is the best way to bring together the diverse pieces of an agricultural communications curriculum. Wagenaar (1993, p. 209) defined a capstone course as "a culminating experience in which students are expected to integrate, extend, critique, and apply the knowledge gained in the major." The Association of American Colleges (as cited in Andreasen & Trede, 2000) recommends capstone courses for all academic disciplines. Crunkilton (as cited in Andreasen & Trede, 2000) identified five required learning activities and six educational outcomes for capstone courses. The activities included project and/or case studies, small group work, issues analysis, oral communication, and industry involvement. The outcomes included decision making, critical thinking, collaborative/professional relationships, oral communications, written communications, and problem solving.

How it works

At Oklahoma State University, the first section of an agricultural communications capstone course (AGCM 4413: Agricultural Communications Product Development) was taught in the Fall 1998 semester and has been taught during each fall and spring semester since that time. Average enrollment is approximately 13 students in the fall semesters and 18 students in the spring semesters. Students may take the course only once, and the vast majority of students will complete the course during their final semester on campus.

During the capstone course, students sell, design and lay out sponsorships; communicate with sponsors; search for, write, peer critique, and edit feature stories about students, faculty, and programs in the College of Agricultural Sciences and Natural Resources; design and create feature story layouts; work with high-resolution graphics; and interact with each other to solve problems and take advantage of opportunities. Each aspect involves firm deadlines for completion. Most semesters, the students have produced a 36-page magazine — the *Cowboy Journal* — with 12 full-color pages and 24 two-color pages. The printing costs (approximately $6,000 per semester) are covered by sponsorship funds raised by the students through sponsorship sales. Quebecor World in Midland, Michigan, prints the publication using "computer-to-plate" technology; all files are transferred electronically from OSU to the Quebecor FTP site.

Results

The capstone experience offers students the opportunity to enhance the knowledge and skills they have acquired in previous classes. One of the strongest assets of the capstone course is the collaboration of students throughout the semester. They learn quickly that teamwork and cooperation are vital to the success of the entire project, just as those skills are necessary in the workplace. They also learn to draw from each other's strengths and help each other through weaker areas. While students can be overwhelmed by the intensity of a capstone course, the majority of students have responded positively when the course is completed.

Through exit interviews, students have indicated that the capstone course is the most useful course in the curriculum: "I can't imagine completing the agricultural communications curriculum without the magazine class. Capstone courses provide a fantastic, 'real world' finishing touch that pulls everything you've learned together" (S. Greenlee, personal communication, December 8, 1999). Nikki Coe (N. Coe, personal communication, November 14, 2000), co-editor for the Fall 2000 issue of the *Cowboy Journal*, indicated that the capstone class was a great way to use her skills and to produce a product that showcased those skills in an interview. In addition, the *Cowboy Journal* has received several honors from the National Agricultural Communicators of Tomorrow, including the Excellence in Publications awards and the first place magazine awards in 1999 and 2000.

Advice to Others

Agricultural communications programs should include a capstone experience in the major curriculum. As Wagenaar (1993, p. 214) has suggested, a capstone course "gives faculty members the opportunity to work with their majors as junior colleagues in the discipline." The benefits to students are concrete, but the departments and colleges benefit as well from the visibility of the final projects created during capstone experiences. The capstone course would not have to be a college magazine as the *Cowboy Journal* is. The course could focus on other media or use service-learning group projects of smaller proportions, but the experience in problem solving, written and oral communication, synthesis of curriculum, decision making, and critical thinking would remain the same. The capstone experience can be implemented regardless of the agricultural communications program's size.

Resources Needed

The resources needed to implement a capstone course vary depending on the type of project students will produce. In the case of a magazine, it would be best if the department had access to a computer laboratory (preferably with ZIP drives), access to central file-storage space, a high-resolution digital camera, Internet access, desktop-publishing software, and image-editing software.

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Developing Leadership Competence: A Coherent Curriculum for Youth in Agricultural Education

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For years leadership has been at the heart of agricultural education, mainly because of the intra-curricular nature of the FFA in the agricultural education program. The National FFA and several researchers have attested to the value of leadership development as well as the influence of the FFA on leadership (Wigenbach and Kahler, 1997; Brannon, Holley, and Key, 1989; Townsend and Carter, 1983; Ricketts, 1982).

While the FFA is an integral part of the agricultural education program, it is not the only part. Agricultural education consists of a triangulation of practices involving classroom/lab activities, the FFA, and Supervised Agricultural Experience. The FFA, though proven in its ability to produce leadership, is only one point of the triad of agricultural education. As leadership development becomes even more important in a transformational vs. transactional world, the goal of the researchers is to develop a model for a coherent curriculum for leadership competence for the classroom/lab phase of "comprehensive" agricultural education.

To develop a conceptual model for a coherent curriculum in leadership development, the researchers evaluated an array of materials that evaluated and described the construct of leadership. Studies like that of Stodgill (1974), Kouzes and Posner (1995), and Bowditch and Buono (1990) as well as numerous others have discussed the value of leadership, but failed to carry their ideas to youth leadership, which is the primary reason for developing a curriculum model for leadership development for agricultural education.

The Model

The model consists of five construct dimensions, which are: (1) Leadership knowledge and information (2) Leadership attitude, will, and desire (3) Decision-making, reasoning, and critical thinking skills (4) Oral and written communication skills (5) Intrapersonal and interpersonal skills. Each dimension must go through the following stages of instructional design: (1) Awareness (2) Interaction (3) Mastery.

How it Works

Each dimension of the conceptual model will have a curricular unit for each stage. The dimensions will be taught on three different hierarchical levels that engage a higher order of thinking. The stages seek to build on the experience and perception of the students in order to enhance cognition and behavior in leadership development.

Implications

According to Gardner (1993), educational systems and institutions have been scolded for their ineffectiveness to produce leaders. The model for formal leadership training of secondary agricultural education students has the potential to aid in even further leadership development that has been historically associated with agricultural education.

Future Plans

The conceptual leadership model has been used in the Leadership Development in Agricultural and Natural Resource Professions course and others within the department of

Agricultural Education and Communications at the University of Florida. It is also the model that guides the leadership option for undergraduates. The model has been presented at the Association of Leadership Educators Conference, and will be presented at the International Leadership Association meeting in November. The ultimate goal of the research is to develop and implement a coherent curriculum for developing competence in leadership for youth in agricultural education.

Costs/resources needed

Time represents the only costs associated with the conceptual model of the leadership development curriculum. A table and place to plug in a laptop would be preferred so that a running power point presentation of the model could be displayed in conjunction with the poster.

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Engaging the Elite Eight: Arizona's Student Teacher Demonstration Experience

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Introduction

The psychomotor domain of learning is an important part of agricultural education instruction (Newcomb, McCracken, & Warmbrod, 1993) and used extensively in the agricultural mechanic and agriscience classrooms.

Motto of the FFA is "Learning by Doing" (National FFA Organization, 2000)

However, they can be confusing, poorly organized, and frustrating if conducted improperly, or when the student audience is not adequately prepared for them, also the opportunity for student injury or damage to equipment is possible as students are not adequately prepared. (Newcomb et al., 1993). A quality demonstration requires both preparation and presentation in order to be effective (McCormick, 1994).

Acceptable teaching practices include the introduction of the lesson followed by the Three Step Method:

- Demonstration by the instructor
- Practice by students; supervision by the instructor
- Application of motor skills

This followed by an evaluation of the student's level of competence in performance.

Methods

Demonstration topics for the University of Arizona' AGTM 100 course, "Principles and Practices of Agricultural Mechanics" are developed to provide students with the necessary instruction to coincide with instructional units taught in laboratory sections. Agricultural Education student teachers are assigned a competency skill to demonstrate to AGTM students utilizing the three-step demonstration method during the fall semester.

The student teachers met with faculty for two class periods to understand the theory of the demonstration method of instruction, learn their assigned competency, and to practice their demonstration before student teacher peers. Student teachers would introduce the skill to the AGTM 100 class. Their introduction includes a presentation of the tools and equipment required to complete the skill, a demonstration of the procedure and the safe use of the equipment or tool required to master the skill, call upon a student from the class to repeat the steps and demonstrate the skill, and finally, answer questions.

The faculty observed and evaluated each demonstration using a prepared evaluation form. The evaluations were shared one-on-one with each student teacher following the completion of their demonstration. Strengths and weakness were discussed as well as suggestions for improvement. A focus group interview with student teachers was conducted after all eight completed their demonstrations to assess attitudes, perceptions of performance, and to gain feedback for improving future student teacher training experiences.

Results and Conclusions

Eight agricultural education student teachers were provided with the opportunity to develop and utilize the demonstration method of teaching during their on-campus pre-service experience in the instructional area of agricultural mechanics prior to their semester-long student teaching experience. Student teachers expressed satisfaction with the experience and confidence in teaching the topic to secondary students. They readily admitted hesitancy about their topic, but agreed that proper instruction, modeling by the faculty, and time to practice and receive feedback contributed to their success. Recommendation made was to videotape the demonstrations for student teachers to review and evaluate.

Implications

Student teachers feel more confident in themselves in presenting demonstrations to students, as well the AGTM 100 class benefited from the instruction provided by the student teachers as they felt less intimidated by other students performing the task and providing guidance while the course instructors looked on and evaluated the demonstrations. This practice should be integrated into other student teacher-preparation programs where laboratory classes such as agriscience and agricultural mechanic technology are part of the regular undergraduate curriculum.

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E-Record Books for Supervised Agricultural Experience Programs: An Information Management Tool for the 21st Century

Larry Ermis, John Dillingham, Texas A&M University
Craig Edwards, University of Georgia

Introduction/Need for Innovation/Background

Experiential learning has long been an instructional method used to facilitate student learning in agricultural education. Often, these experiences have resulted from the student's Supervised Agricultural Experience (SAE) program (Camp, Fallon, & Clarke, 1999). Traditionally, students have been encouraged to document or "record" significant events related to their SAE. These data also provided the information used by students to complete applications for degrees and awards made available through the FFA. Camp et al. (1999) identified the factor "complete records are maintained by the students" (p. 167) as one of the most important guides for conducting an "effective" SAE. Frequently, the need to maintain "complete records" has manifested itself in students using some form of a record keeping journal. Usually, this has been a paper or hard copy "record book." However, Murphy and Terry (1998) stated that "computer-based telecommunications technologies" (p. 35) such as "electronic communication, information, and imaging technologies will improve how we teach in agricultural education settings" (p. 34). Yet, Harper (1993) posited, "We cannot expect students to learn the latest technologies without having active involvement" (p. 10). To this end, the Instructional Materials Service (IMS), Department of Agricultural Education, Texas A&M University in cooperation with the Texas Education Agency (TEA) and the Texas Engineering Extension Service (TEEX), has developed a web-delivered record book. This electronic record book is available to students and teachers—any time, anywhere, and any place—provided they have access to the Internet and a web browser.

In 1998, teachers and TEA personnel formalized the need to improve and update the existing record book. It was decided that a revised book should reflect *General Accepted Accounting Principles (GAAP)* and *Farm Financial System (FFS)* procedures, and include the essential data necessary for students to complete an application for the National FFA *American FFA Degree*. During the 1999-2000 school year, more than 4500 newly revised record books were distributed to 33 Texas and three out-of-state departments participating in a pilot test. National FFA and TEA staff provided assistance during the development process as well. TEEX personnel developed a "prototype" web-delivered e-record book based on the newly revised hard copy "template." Following input from stakeholders about alternate delivery methods to the traditional paper format, and after further exploring web-delivery options, it was decided to develop fully a web-delivered electronic record book.

How it Works

The web-based, e-record book will be made available online. Depending on anticipated annual need, "user" (student) subscriptions (e-record books) will be provided on a departmental basis; subscription will include data storage and archival options. System access will require both a "user id" and a password. Teachers will serve as on-site "administrators." After requesting their department's annual subscription(s), teachers will be provided user identifications and passwords to assign to individual students. Instructors will have the option of obtaining additional subscriptions throughout the year, and will have the online capability to access and evaluate their students' e-record books, view school account information, and add/delete students as needed. The TEEX and the Computer Information Services (CIS) at Texas A&M University will provide technological expertise and the server space necessary to support database management and the archiving of students' records. A linked "Contact IMS" email address is available to all users of the e-record book, and a LISTSERV has been provided to answer teachers' questions about record keeping, the newly revised record book, and the online e-record book.

Implications and Future Plans

A web-delivered record keeping system, one that has been designed and customized to meet the needs of students conducting a SAE program, should provide students and teachers with significant opportunities to acquire and use computer-based telecommunications skills (Murphy & Terry, 1998). Moreover, because acquisition and mastery of these skills will take place within the context of a ubiquitous program component (i.e., SAEs), potentially, all students could benefit. Pragmatically speaking, the web-delivery system will accommodate either PC or Macintosh platforms, which may further increase its potential for use; yet, besides a web browser, there is no requirement for locally-installed software or the concomitant need for updating. Also, because of the nature of web-delivered technologies, any future system changes should cause minimal disruption in service when compared to other electronic alternatives such as replacement diskettes or CD-ROM upgrades. After additional developer beta testing, the e-record book will be pilot tested in the spring of 2001. Trial subscriptions will be made available to university agricultural education departments, state and nationwide, for use by pre-service teachers and teacher educators. General availability is expected to begin in the 2001-2002 school year. Moreover, the next anticipated system upgrade will provide users with the capability of generating completed FFA Degree applications from the data stored in their e-record book(s).

Resources Needed

Users must have Internet access and a web browser. The CIS host site at Texas A&M University server requirements include a Windows NT Server (v. 4.0 or higher) with the Microsoft IIS web server (latest version) installed, Allaire's ColdFusion Server Enterprise Edition application server (v. 4.5 or higher), and Microsoft's SQL Server (v. 7.0 or higher).

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Feel the Burn!
Electronic Portfolios in Agricultural Education

Robin L. Peiter, Matthew T. Portillo, Jamie Liston
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Teaching portfolios are being used in teacher education programs providing students with a personal tool for reflecting on their teaching ability, knowledge and understandings. Hurst, Wilson, and Cramer (1998) defined portfolios as reflective summaries of self-reflected artifacts, representations of teaching credentials and competencies, holistic views of teachers and documentation for strengthening interviews. Artifacts typically include the teacher candidate's resume, personal philosophy statement, professional goal statement, self-reflections, examples of lesson plans and unit plans, current grade report, and letters of recommendation. The artifacts are compiled by the teacher and placed in a binder. However, problems exist regarding portfolio binders. Teacher candidates perceive the portfolio to be costly to produce. In an interview, it is awkward to utilize and difficult for the administrator to examine in the time allowed (Irby & Brown 1998).

An alternative to the traditional portfolio is the electronic portfolio. Electronic portfolios document video, photos, and text available within one form of media. According to Sheingold (1992), through using technology to store student portfolios, we can make their work portable, accessible, and more easily and widely distributed. We can also replay performance works anytime. A research study by McKinney (1998), showed creating electronic portfolios allowed students to be reflective, and participants viewed the experience as positive and useful.

How it Works

In Spring 2000, the Agricultural Education Program at Oklahoma State University secured funding through the OSU Assessment Office to hire a Portfolio Assistant to aide Agricultural Education Teacher Candidates with preparation of student portfolios. Additionally, the Portfolio Assistant was assigned the responsibility of piloting an electronic portfolio. A goal was established that in Fall 2000 every teacher candidate would have an electronic portfolio to supplement his or her paper portfolio. Teacher candidates developed their own template and submit artifacts in the form of videotapes, lesson plans, goal statement, philosophy statement, Supervised Agricultural Experience policy statement, grade report and resume. After obtaining the template and artifacts, the portfolio assistant then organized and recorded the information on a compact disc for each teacher candidate. Numerous disks are burned as it is low in production cost and easy to duplicate. In the interview setting, the teacher candidate could leave the compact disk with the administrator. The advantage would be the administrator could view another dimension of the teacher educator's credential, and by leaving the electronic portfolio with the administrator he or she may view the electronic portfolio at a later date and in more depth.

Results to Date

The Agricultural Education program at Oklahoma State University has seen direct benefits by having its teacher candidates complete an electronic portfolio. All students in the Fall 2000, Spring 2001, and Fall 2001 student teacher classes developed templates and submitted materials to be recorded in the document. Artifacts demonstrated were a resume, grade reports, lesson plans, philosophy statements and goal statement, photos and 15 second video excerpts from their teaching experience. The portfolio assistant utilized a html format in creating the electronic portfolio and burned it onto a compact disk. Teacher candidates also submitted a paper portfolio as part of their certification. The electronic portfolio should not replace the written portfolio; rather it should supplement it.

Costs/Resources Needed

Several resources are needed to effectively produce an electronic portfolio. Multi media equipment needed, including costs, are: a video capture card ($300), scanner ($200), computer, and compact disks. Other expenses associated with this project are the undergraduate assistant's office space and salary estimated at $400 a month.

Future Plans/Advice

Many aspects to electronic portfolios have been learned through this process. Although some problems have been encountered, the majority of the project has been extremely positive. Some teacher candidates do not have the technology available or the knowledge gained to create the documentation. Therefore, the undergraduate assistant's role is viewed as a vital aspect in creating successful electronic portfolios. Future plans include enhancing teacher candidate's computer skills, as the electronic portfolio would force students to learn a new program and adapt to others available. In reality, the portfolio binder could be minimized, even eliminated, leaving a compact disk with the administrator to review many times allowing him or her to chose the best candidate for the job.

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The ILLINOIS LEADERSHIP Initiative: A Proposed Leadership Certificate Program for the Students of the University of Illinois at Urbana-Champaign

Annie Hernandez
University of Illinois at Urbana-Champaign

Two years ago, the University of Illinois at Urbana-Champaign brought together a core group of individuals from all colleges within the university to develop a campus-wide philosophy of leadership. This philosophy is the foundation for the ILLINOIS LEADERSHIP Initiative and the basis for the series of leadership skills and attributes that serve as the programming efforts of the initiative. These skills and attributes focus on four stages of leadership development for a student: Self Development, Interpersonal Development, Organizational/Group Development, and Transitional Development.

This past year (2000-2001) five working committees were established to forge ahead on various fronts concerning the initiative. These included: Marketing, Academic Integration, Recognition, Program Curriculum, and Assessment. The products of the Academic Integration and Recognition committees will be the focus of this proposal. The charge of the Academic Integration committee was to explore ways to integrate leadership development into the curriculum, investigate linkages between curriculum leadership development and co-curricular opportunities, and pursue feasibility of an undergraduate minor in Leadership. The role of the recognition committee was to consider ways to recognize students who have participated in the Illinois Leadership Initiative and pursue creation of a leadership portfolio for students to chronicle their personal leadership development. The link between these two committees is evident and with the hope of having some kind of academic leadership framework available to students by the Fall of 2002, the feasibility of designing a certificate program was evident. Immediately, the search for certificate programs and portfolios used nation-wide ensued. From these and committee ideas, a proposal was made to the full initiative committee with the attendance of the Provost and Vice-Chancellor of Student Affairs at the close of the Spring semester of 2001.

How It Works

A Leadership Certificate is seen as an integral part of the implementation of the ILLINOIS LEADERSHIP Initiative. The certificate will allow students involved in various aspects of the initiative the opportunity to "package" their experiences into tangible evidence of their commitment to develop personal leadership skills as part of their University of Illinois experience, regardless of their academic field of study.

As for program management and leadership, there will be a coordinating committee at the campus level that will be responsible for the overall operation of the program, a program leader within each college that will participate on the Campus Certificate Group, and faculty and staff from each college that will be coaches and mentors to student participants.

To complete and earn the Illinois Leadership Certificate, a student must fulfill the following four components:

1. Participate in CORE leadership programs/conferences/workshops.
    a. Complete all four CORE Programs that have been and will be created and offered through the Office of the Vice Chancellor of Student Affairs. The programs will be directly linked to the four stages of leadership development: Self Development, Interpersonal Development, Organizational/Group Development, and Transitional Development. The first two CORE programs, Insight and

Intersect, have been developed, piloted, and revised. The third program curriculum has been proposed.

   b. Complete at least two of the CORE programs, and participate in a LeaderShape Institute or a leadership development program sponsored by another organization or in three workshops from inside or outside the university.

2. Complete academic course work related to leadership development.
   a. Complete a minimum of three courses from regular UIUC course offerings that have at least 75% of the topics related to the Illinois Skills and Attributes.
   b. Complete a minimum of six courses from regular UIUC course offerings that have 25-74% of the topics related to the Illinois Skills and Attributes.
3. Participate in Group/Team activities.
   a. Participate in two organizations for at least one semester, contribute to the goals of that organization, observe the leadership efforts, document the leadership "lessons learned" and include those observations in the Leadership Portfolio.
   b. "Organizations" include student organizations, civic engagement opportunities within the community, internships or part-time jobs, and faculty research projects.
4. Complete a Personal Development Plan and Leadership Portfolio.
   a. The Personal Development Plan will be completed with a coach or mentor and will include at least four major improvement objectives. Two will focus on personal improvement and two on activities from component three.
   b. The Leadership Portfolio will demonstrate that the certificate candidate has learned and grown by participating in the program, as it is a compilation of their work accompanied by reflections on the importance of each element included. Given the ILLINOIS LEADERSHIP Skills and Attributes, candidates would provide evidence of their mastery of at least one skill in each of the four major skill areas.

Future Plans

Since the Leadership Certificate has been proposed, the other initiative committees have examined their role and taken action. For example, the creation of a Leadership Center that will house the certificate program is now a goal for the Fall of 2002. This academic year, the Academic Integration and Recognition committees have been charged to propose a minor in Leadership studies to complement the certificate and to continue identifying classes that could fulfill the academic course component. In the future, faculty and college buy-in of the ILLINOIS LEADERSHIP Initiative and Certificate program will be essential to ensure students campus-wide are aware, motivated, and involved. Therefore, representation from all colleges must be present on initiative committees and financially in collaboration with Student Affairs. The Illinois Leadership Initiative is in its infancy but as the implementation of Initiative ideas such as the Leadership Certificate Program occur, the development of leadership skills and attributes within students will be positively impacted.

Integration of Agriculture/ Environmental Science and Academic Education through Collaborative Proposals

Thomas Bruning, Xiaorong Shao
The Pennsylvania State University

One of the problems facing secondary education is the separation of academic and vocational education, which has been seen as a major factor contributing to the failure of preparation of students either for the workplace or for college. Teahen (1996) specifies that vocational educators have been criticized for promoting overly specific training while academic educators are blamed for providing instruction that is neither participatory nor connected to the real-world's requirements (Teahen, 1996). As a result, the graduates schools turn out usually lack problem-solving abilities, higher-order thinking skills, communication and employability skills that are all crucial for work in today's fast-changing society (Lankard, 1992). To seek new approaches to improve secondary education, many educators believe that the integration of academic and vocational education is a solution, in which students can be better prepared to work and learn, and to use their hands as well as their minds.

Purpose and Objectives

Integration is an abstract concept for most undergraduate students. Proposal writing is equally confusing and mysterious for many students and some teachers. At the same time, both of these conceptual abilities are increasingly important to Career and Technical Educators. At Penn State University, we have enhanced a senior-level teacher preparation course to include both of these concepts. To turn theory into effective educational practice, we developed a new approach to teach students integration and proposal writing.

The purpose of this project was to prepare undergraduate students for innovative ideas and practices, and promote a sound environment for integration education in secondary schools. The objectives included:

- Identify and explain integration and how to use this concept in a secondary school in Pennsylvania.
- Explain how to write a proposal to integrate academic theory and vocational practices.

Procedures and Methods

The course: *Effective Laboratory Development for Agricultural and Environmental Science* (AEE 418) was taught in the fall semester 2000 for students preceding their student teaching internship in the spring 2001. The students were required to develop an integration proposal with their cooperating teachers, academic teachers and the principal of their school. Students were first taught the basic principles of integration and then they were required to find at least 10 publications that further explained integration through library and Internet research. During proposal writing, students were also required to visit their schools several times and to determine the school culture, procedures used at the school, and to learn more about their students. The next step was to systematically teach students how to write their proposals. In each class session, students learned about the contents of each section of the proposal then they wrote that section. Week by week students developed a proposal that could meet the requirements of the RFP that was handed out with the syllabus.

To enhance the realism, quality, and purpose of proposal writing, all students competed for $400 mini-grant dollars-for each proposal. Students were informed that each of their budgets for proposal could not exceed $400 – unless they could generate matching local school district resources. Students were highly encouraged to seek their cooperative and academic teachers, other students and virtually anyone (other than professional proposals writers) to help them write and develop their proposals. Students were encouraged to develop a collaborative team project.

Upon completion of proposal writing, students were required to present four copies of the final proposal with all participants signed-off on the cover sheet. Students were also required to give a presentation of their proposal as their class final. Each proposal along with a score sheet and the original RFP were sent to three professionals that were knowledgeable about integration and agricultural education programs. The scores were averaged and a matrix was developed to determine the eight winning proposals. During the spring of 2001, the students were required to implement their proposals at their student teaching site. Students and all participants were sent letters of congratulations and were asked to confirm their acceptance. Seven out of eight projects were carried out.

Results

Seven themes involved in the integration projects included: Language arts in agricultural education; Raising wetland awareness in the community through integration project; Land-mapping using global position system (GPS) technology; Learning with live tree specimens; Groundwater flow model; Hydroponics and Interpretive trail. The integration projects covered many subjects taught in secondary schools. These included English, mathematics, physics, biology, geometry, environmental science, horticulture, agriculture, animal science, plant science and computer science.

The results achieved by the project are very positive and encouraging. First, the implementation of the project has generated better understandings conceptually and practically about proposal writing and integration education. Second, the implementation of the project was able to generate more funds and collaborations from the local schools. One school allotted an extra $780 for a project. Another student's project "Interpretive trail" was incorporated into a $120,000 grant. Third, the integration activities provided student teachers with an active learning environment, which has increased their interests and motivation for a purposive and challenging learning opportunities. Students now have a clear idea of the process and benefits of proposal writing. Moreover they also have a practical and stronger knowledge base regarding the use of integration in secondary schools. While some students were not funded, all received the same education and they now should have a better idea of what it will take to develop a winning proposal as they enter the professional ranks.

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Licensure in Education for Agricultural Professionals (LEAP)

Gary Moore
North Carolina State University

Introduction

"In the next ten years we need to recruit 2.2 million teachers"
Former Secretary of Education Riley

American education is facing a serious shortage of qualified teachers. Agricultural education is one of the fields with a teacher shortage. Fifty-five high school agricultural education departments closed in 1998 because no teachers were available (Camp, 2000).

Traditional teacher training programs in agricultural education have not been able to supply the number of teachers needed in the field for at least the past two decades (Camp, 2000). Jack Welch, former CEO of GE said, "When the rate of change outside exceeds the rate of change inside, the end is in sight." The LEAP program is an "outside" approach to attacking the agricultural education teacher shortage.

LEAP could be described as a non-traditional teacher certification program in agricultural education for non-traditional students. LEAP is a web-based, teacher certification program in agricultural education The target audience is individuals who have baccalaureate degrees in agriculture and natural resources who are ready for a career change but because of family, work or accessibility issues cannot go back to the university full-time to become certified to teach. The program is available nationwide and is delivered through the Internet. North Carolina State University is the lead institution but the University of Arizona, the University of Missouri, the University of Delaware, Washington State University, Fort Valley State University and Wayne State University are involved in the consortium.

How it Works/ Methodology/ Program Phases/ Steps

A formal application process is required to be admitted to the LEAP program. The minimum admission requirements are listed below:

- The applicant must possess a baccalaureate degree in agriculture, natural resources or closely related field from an accredited institution of higher education.
- The applicant must have 2.5 GPA on all collegiate level work.
- The applicant must submit an essay detailing why he or she desires to be a teacher.
- The applicant must submit three letters of recommendation that focus on the applicant's character, work ethic, academic ability and suitability to becoming a teacher.

After the student is admitted to the program, he/she will complete 24 hours of course work. The required courses are listed below along with the individuals involved in their development. The first group of courses are available over the Internet.

AEE 500 - Agricultural Education, Schools and Society (3 hours). Pat Barber and Richard Bacon, University of Delaware – Gary Moore, NCSU
AEE 503 - Youth Organization Management (3 hours). Jim Dyer, University of Missouri – Barry Croom, NCSU
AEE 522 - Occupational Experience in Agriculture (3 hours). Curtis Borne, Fort Valley State – Gary Moore, NCSU
AEE 528 - Instructional Design in Agricultural Education Jim Morrison, Wayne State University – George Bostick, NCSU <u>or</u>

AEE 529 Curriculum Development in Agricultural and Extension Education (3 hours). Beth Wilson, NCSU
AEE 535 - Teaching Agriculture in Secondary Schools (3 hours). Jim Knight, University of Arizona; Mike Swan, Washington State University—Jim Flowers, NCSU
AEE 641 – Practicum in Agricultural and Extension Education (3 hours). This is a teaching internship that is equivalent to student teaching. Some live classroom observations are made but many of the classroom observations are accomplished using Digital Video Cameras (webcams), PCs and NetMeeting software.

Adolescent Development (3 hours) and Educational Psychology (3 hours) – Students may complete these courses from any college or university.

Students who successfully complete the program receive a class "A" teaching license from the state of North Carolina. A North Carolina teaching license is recognized in 49 states.

Results to Date/ Implications

The official launch date for the LEAP program is January of 2002. However, the program is already up and running. Because of the demand for this program, the consortium members accelerated their course development efforts and students have already been admitted to the program. Currently 24 students are enrolled in two LEAP courses. Of these 24, 13 have officially applied and been admitted to the LEAP program. The others are in process. The "average" student in the program has a mean undergraduate GPA of 3.09 and has been out of college for nine years. The most common undergraduate degrees are agricultural economics and dairy science. The current LEAP students have undergraduate degrees from Auburn, Ferrum College (VA), North Carolina State, Penn State, Purdue, Southeast Missouri State, Tarleton State, Maryland, Massachusetts, Wisconsin, and Western Carolina University. It is anticipated that the enrollment will double or triple within the next year.

Future Plans/ Advice to Others

Universities who currently have agricultural education programs who desire to get involved with this program are welcomed.

Costs/ Resources Needed

The development of this program was made possible by a $75,000 grant from the American Distance Education Consortium. It is anticipated that tuition revenues will make the program self-supporting.

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Missouri Summer Technical Institutes: Professional Development for Agricultural Educators

Weston D. Walker, Robert J. Birkenholz, Gordon V. Laboube
University of Missouri-Columbia

Agricultural technology is always changing and as a result, agriculture teachers need opportunities to update their knowledge and skills. However, agricultural educators are busy with numerous responsibilities including teaching several different courses, supervising SAE programs, and coordinating FFA activities. In addition, agriculture teachers desire graduate credit and professional development.

Program Description

Through a joint effort, the Missouri Vocational Agricultural Teachers Association (MVATA), the Missouri Department of Elementary and Secondary Education-Agricultural Education Section, and Missouri agriculture teacher education programs have worked together to address the issues faced by practicing agricultural educators. The summer technical institute program was designed to provide Missouri agricultural educators with opportunities to develop and enhance in-depth, high quality, and state-of-the-art technical information and skills. This is an on-going program in which summer technical institutes for agricultural instructors are conducted in an intensive one-week format during each June or July. One primary concern for each technical institute is to promote conducive learning environments by utilizing quality facilities and technical experts, relevant to the content addressed. In addition, enrollees can earn CEU (Continuing Education Unit) credit administered by MU Direct or enroll for two hours of graduate credit in AgrEd425–Inservice Course in Agricultural Education.

Program Objectives

1. Demonstrate and promote the integration of academic concepts into agricultural education.
2. Integrate technology (agribusiness and educational) into the educational process for agricultural educators.
3. Emphasize the need to promote an understanding of 'all aspects of the industry' and entrepreneurship among agricultural educators.
4. Improve the technical knowledge of agricultural educators in the respective subject areas.
5. Develop and enhance the technical competence and skills of agricultural educators in the respective subject areas.
6. Incorporate high-tech knowledge and skills into local agricultural education programs.

Results

<u>Offerings</u> – Missouri agriculture teachers had the opportunity to develop knowledge, skills, and abilities in the technical areas of:

- Agricultural Power Technology – *Diamond Engines, Lenexa, Kansas.*
- Large Project Construction – *Carthage, Chillicothe, and Farmington Agricultural Education Programs.*
- Meat Science – *University of Missouri and Southwest Missouri State University Meat Laboratories and faculty.*
- Greenhouse Operation and Management – *Hummert's Greenhouse Int'l, St. Louis, Missouri.*

Involvement – A total of 117 agriculture teachers enrolled in eight technical institute sessions. Enrollment was limited to 10-25 participants per technical institute on a "first come, first served" basis. Total graduate credit hours awarded through the summer technical institutes were 196, in addition to 78.2 hours of Continuing Education Units.

Participant Evaluation Comments

- *Fun and educational*
- *Excellent, very enjoyable, a quality experience*
- *I learned more in one week than in four years of teaching*
- *Top of the line, it was great*
- *Excellent class, had a great time working with other agriculture teachers from across the state*
- *Good balance of theory and practice*
- *This is the best course I have taken in years*

Funding

Revenue	
Institute Registration Fees:	$18,000
Graduate Credit Fees:	16,818
Industry Donations:	8,400
Total Revenue	**$43,218**

Expenses	
MU Direct Management Fee:	$8,000
Instructor Stipends:	6,000
Continuing Education Units:	375
Industry Donations:	8,400
Industry Subcontracts:	8,130
Direct Expenses:	2,300
Provost's Office:	2,343
MU Direct:	1,171
Program Coordination:	6,499
Total Expenses	**$43,218**

Providing an Urban Experience for Agricultural Teacher Preparation

Pauline Dicke, Roland Peterson
University of Minnesota

History of the Partnership:

The partnership began in 1989, the same year the Chiron Middle School began operation. The "Ag Ed" program at the University of Minnesota became an early partner. The program has evolved over the years, but is still founded in Chiron's original vision of providing students with community-based learning. The agricultural Education partner works to meet the goals set forth by Chiron Middle School. These include:

- student growth
- hands-on, experiential learning
- innovative curriculum
- developing mentor relationships

This has been a win-win situation for both institutions. Hopefully it will continue well into the future.

How the Partnership Works:

All science students in the Chiron School are given the opportunity for an enhanced learning experience at the St. Paul Campus site. The features of the program include the following:

- Chiron students are paired in groups of 4 or 5 and matched with a college student, generally an Agricultural Education major, who serves as a teacher and mentor.
- A science experiment is developed. This experiment revolves around broad areas of agriculture and mirrors one of the concepts being taught in the Chiron science classroom for that semester.
- A scientific experiment is conducted. Together the group recognizes a problem and forms a hypothesis. Next, the group conducts their experiment once the procedures they will follow are laid out. Once all of the trials are finished the group will make their final conclusions and record their final results.
- A short paper is written. This highlights the scientific process used and the results discovered.
- Science fair display boards are assembled. These lay out the experiment and show the recorded results. In addition a short presentation is prepared.
- Group presentations are given on the final day of class in front of members of the faculty in the Division of Agricultural, Food and Environmental Education Department. In addition, there is a celebration to recognize the accomplishments of all students.
- Display boards are put on display in the Chiron Middle School for other students, teachers and parents to see.

The Purpose of Our Partnership:

"This is one phase of the Chiron students' science experience. At the St. Paul campus site, students use the context of agriculture to make the principles and concepts of science real.

Agriculture dominates the economy of Minnesota and also touches the lives of every citizen in the state (through food systems, natural resource systems and much more.) By teaching science in an agricultural context, University of Minnesota students and Chiron students are able to make education real. This principle of experiential learning is important in any subject. In addition, this program is an important signature of both programs, making each a unique experience for their students."

Dr. Roland Peterson
AFEE Department Head

Advantages of the Program

This is a unique program for both Chiron and the U of MN. Therefore, this partnership gives all participants a very unique opportunity.

Chiron Students:

- Receive experiential learning and gain a greater understanding of science & the environment
- Develop problem solving and decision making skills
- Understand and value human diversity through the mentoring/mentored relationship
- Develop teamwork skills
- Identify science and agriculture connections in many real life situations

University of Minnesota Students:

- Are provided an opportunity to teach and realize the special values of their efforts
- Experience the benefits of a mentoring relationship
- Have and opportunity to work in a "non-traditional" agricultural education setting. Components of this experience include:
  - an urban school setting & extensive experience with a diverse population of students
  - a middle school setting
  - an integrated experience with science
- Understanding how to set up, work through and present a science experiment
- Learn how to use the context of agriculture with a core subject area

Cost of the Program

Minneapolis Public Schools provides $20,000 to the U of MN. This supports a 50% graduate student at the Master Level.

The Teaching College Course: A Faculty Development Program to Enhance Teaching Quality in the College of Agricultural, Consumer, and Environmental Sciences at the University of Illinois at Urbana-Champaign

A.L. Hernandez, R.K. Barrick, S.J. Schmidt, P. Buriak, C.J. D'Arcy, J.B. Litchfield
University of Illinois at Urbana-Champaign

Introduction

Faculty members at research-based institutions have been extensively trained in their research discipline and are expected to establish and maintain successful research programs. Most of these same faculty have received no formal preparation in teaching methods, yet are expected to become effective teachers. This is an unrealistic expectation that often leads to use of ineffective teaching practices and frustration for both teachers and students. This does not have to be the case; faculty can become effective and empowered instructors by learning how to teach. This is the precise reason The Teaching College Course was developed by five senior College of Agricultural, Consumer, and Environmental Sciences (ACES) faculty members at the University of Illinois at Urbana-Champaign (UIUC). The overall goals of the course are to improve the quality of the participant's instruction for the purpose of enhancing student learning, and to develop and foster an active teaching community for dialogue and sharing best practices, similar to the communities that have evolved in the research and outreach missions of UIUC.

How It Works

The Teaching College is a ten-week course held in the Fall that to date has enrolled up to 26 faculty members, teaching associates, and selected graduate students that are nominated by their respective department heads. The class topics, which incorporate theoretical and practical information, include learning styles, learning theories, course development and levels of cognition, conducting effective lectures, discussions, and laboratories, active learning, out of classroom instruction, reflective teaching, assessment of faculty teaching and student learning, self assessment by teaching portfolios and teaching philosophy statements, and instructional technology. During each class session there is dinner served and time for interaction and discussion with colleagues about individual progress and specific classroom concerns. Throughout the semester, each participant develops a teaching portfolio and completes a peer observation. As resources, each participant is given two textbooks on teaching and access to the course website (WebCT). In addition, graduate students who complete this course have the opportunity to attend eight one-hour seminars on University governance and write a short paper for 0.5 units of credit during the Spring semester.

Results to Date

Since its inception in the Fall of 1997, 101 participants have completed the Teaching College Course. From participant responses to the end of the semester survey, the following topics/activities, in decreasing order of significance, have been listed as follows: Reflective Teaching (20%), Course Development and Cognition Levels (12%), Active Learning (11%), and Learning Theories (10%). Ninety-three percent of the participants reported that their teaching and learning processes improved as a result of the Teaching College Course and fifty-two percent of the participants responded that they began using a variety of teaching methods and active learning tools in their classroom. The main reason this increase occurred was because participants now realized they needed to reach a variety of learners in their classroom, based on the learning styles and learning theories sessions. As one participant stated, "I also learned that not everyone learns like I do. The learning styles section [of the course] made it clearer to me that I need to incorporate different teaching methods to accommodate different learners, and the section gave me some practical ideas about how to do that." Another participant responded, "The biggest way my teaching has changed is that I am more aware of whether my students are actually learning or if I am just teaching." Suggestions made for program improvement are considered and implemented if found valid. Ninety-seven percent of the participants indicated they were satisfied or very satisfied as a learner during the Teaching College Course.

Future Plans

As for the future, the number of participants will remain stabile due to continual college turnover. The course content will be continually updated and improved. Teaching College reunions have been and will continue to be one way past participants can renew and establish cross-class relationships. Another way the teaching community is facilitated is by each participant having continued access to the rich repository of information found in the course website.

Resources Needed

The Teaching College Course has received financial support from the College of ACES, the Teaching Excellence Endowment, the Warren K. Wessels Academy of Teaching Excellence Fund, and four consecutive Provost's Initiative on Teaching Advancement (PITA) grants from the UIUC Teaching Advancement Board. Due to the overwhelming success this course, funding has not and should not be a problem in the future.

The Texas New and Returning Teacher Program

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Introduction

The agricultural science teacher of today faces many challenges while performing her/his duties. The rigorous academic demands of the agri-science program are further compounded by additional activities that occur both inside and outside the classroom. Curriculum changes, classroom management, course scheduling conflicts, Supervised Agricultural Experience Programs and competitive FFA activities are just a few of the areas teachers must deal with on a regular basis. It is difficult for an experienced teacher to be successful in these and other aspects of the agri-science program and even more so for a teacher with little or no experience.

Successful completion of a university-level agricultural education certification program is not a guarantee that a beginning teacher is well prepared for the agricultural science teaching profession. The student teaching experience provides adequate real-life opportunities, but it does not expose a future educator to every possible situation that will be encountered during their career. The fact that many teachers in general leave the teaching profession before their fifth year is indicative of the difficulties and challenges presented by the field of agricultural education, and education in general. Unfortunately, many do not have a professional support structure that fosters encouragement and assistance (McGregor and Lawver, 1997).

The New and Returning Teacher Program was initiated in 1996 as a statewide program designed to assist new and returning agricultural science teachers in Texas with understanding, coordinating, and conducting well-rounded agriscience programs. Developed by the Agricultural Education and Communications Department at Texas Tech University, in conjunction with other state teacher educator institutions, the program is funded by a grant received from the Texas Education Agency. The methodology utilizes an annual workshop, a mentoring program, and state-of-the-art technology to provide distance education opportunities for those who have chosen agricultural science and technology as their profession.

Positive feedback through evaluations has been received on the general program itself. Beginning teachers have found the annual workshop, held in conjunction with the Texas Agricultural Science and Technology Professional Development Conference, very beneficial to their beginning needs. The mentoring program, designed to place a new teacher with an encouraging role model, has proven successful for those participating.

Although positive benefits from the program has prompted continuation, the Texas New and Returning Teacher Workshop is currently being restructured. The utilization of the mentoring program has not been consistent by those participating. Initially, the program was designed to deliver a monthly videoconference to beginning teachers via the Trans-Texas Videoconference Network (TTVN). Due to the rigorous activities and nature of Agricultural Science Teachers, consistent scheduling to meet the needs of all participants could not be achieved.

Program Structure

Previously, the methods used to achieve the objectives of The New and Returning Teacher Program consisted of an annual workshop, a mentoring program, and utilization of state-of-the-art technology to provide distance education opportunities. Due to positive responses concerning the program, the previous methodology will be used and modified. Future workshops at the Texas Agricultural Science and Technology Workshops will stay consistent with the previous.

The mentoring program will mirror the concept previously used; however, more teachers will be identified to serve as mentors. This will provide new teachers access to questions and concerns from a larger, thus more available, pool. Frequent communication between teachers and mentors will continue to be pushed in addition to scheduled conferencing time. Mentors will also be encouraged to initiate contact between themselves and new teachers.

Delivery of workshops, relevant information, and discussion of upcoming events via teleconferencing has proved to be inefficient. Agricultural Science Teachers are characterized with complex activities and schedules. Identifying a schedule appropriate for every teacher in the program has proved unsuccessful. Fraze (2001) discovered 83.94% of Texas Agricultural Science Teachers have immediate access to the Internet. Texas schools are consistently adding and updating Internet access with high-level connections. Because of this resource, delivery of relevant information and upcoming events will be presented with an updated web site. As technology progresses and diffuses among Texas schools, video conferencing and workshops will be achieved via the Internet.

Evaluation

The Texas New and Returning Teacher Workshop will continue evaluation utilizing current techniques. Surveys will be conducted yearly at the Texas Agricultural Science and Technology Teacher Conference. Because these surveys are often mistaken with the workshop only and not the entire program, comments and suggestions will be received through the web site and E-mail. Although it is often considered invalid, vocal responses and feedback from participants will continue to be analyzed and considered.

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