1999
Gateway to the Future

Proceedings of the 53rd Annual
AAAE Central Region Research Conference
& Seminar in Agricultural Education

February 25 - 27, 1999
St. Louis, Missouri

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Table of Contents

Papers Presented

Session A: Agriculture Literacy and 4H

Session B: Web-Based Instruction and the Internet

Session C: Distance Education

Session D: Teaching, Achievement, and Retention in Undergraduate Education

Session E: Experiential Learning

Session F: Secondary Agricultural Education

Preface

The AAAE Central Region Agricultural Education Research Conference and Seminar was conducted as a joint event February 25, 26, and 27, 1999 at the Adam's Mark Hotel in St. Louis, Missouri.

The AAAE Central Region Research Conference is a major forum for disseminating results of research and scholarly activity within the Central Region of the American Association of Agricultural Education (AAAE). The fifty-third research conference was an annual activity involving the presentation of papers selected through a blind review process. Reviewers from within the Agricultural Education profession outside of the region were asked to review papers submitted for consideration. They are noted on page x of this publication.

Nineteen proposals were accepted following the recommendations from the reviewers. The acceptance rate for papers presented at the 1999 AAAE Central Region Research Conference was 63 percent.

Four criteria were established for decision-making regarding acceptance of papers for the 1999 AAAE Central Region Conference. The criterion included:

1. Followed paper specifications;
2. Ranked among the highest papers by reviewers;
3. Achieved at least one ranking of either a "four" or "five"; and
4. Achieved an average rating of 3.00 or higher.

Papers submitted for presentations at the AAAE Central State Regional Research Conference were forwarded to one of six volunteer discussants. They were requested to review three or four papers and submit written comments for the conference proceedings.

Papers presented at the 1999 AAAE Central States Regional Research Conference are listed on the table of contents in the order presented. Written comments provided by discussants appear immediately following each paper.

Three papers were presented at each of the five sessions and four papers were presented at the final session. Discussant comments were presented orally following the conclusion of paper presentations in each session. Following the discussant's comments, presenters were provided the opportunity to respond to questions raised by the discussant. The session chairperson was then asked to serve as a moderator to lead a group discussion involving members of the audience, the paper presenters, and the discussants for the remainder of the session.

Conference Schedule

Thursday, February 25

7 - 8 p.m.	Undergraduate Conference Registration
7 - 9 p.m.	Research Conference and Seminar Registration

Friday, February 26

7:30 - 8:30 a.m.	Research Conference and Seminar Registration
8:30 - 10 a.m.	Research Sessions A and B ❑ Session A~Agriculture Literacy and 4H ❑ Session B~Web-based Instruction and the Internet
10 - 10:20 a.m.	Break
10:25 - 11:55 a.m.	Research Sessions C and D ❑ Session C~Distance Education ❑ Session D~Teaching, Achievement, and Retention in Undergraduate Education
Noon - 1:15 a.m.	Lunch (provided with program registration) ❑ Speaker Dr. Roscoe Vaughn, National Council for Agriculture Education; "Research Implications for Reinvention of Agricultural Educaiton for the Year 2020"
1:30 - 2:30 p.m.	Poster Session and Refreshments
2:30 - 4:15 p.m.	Research Session E and F ❑ Session E~Experiential Learning ❑ Session F~Secondary Agricultural Education
4:30 - 5:30 p.m.	Business Meeting, Committee Meetings, Professional Development and Communication
5:30 - 7:30 p.m.	Dinner (on your own)
7:30 - 9 p.m.	Graduate Student Session, "Preparing for the Professorship"

Saturday, February 27

8:30 - 10 a.m.	Agriculture Education Seminars ❑ Seminar A~Program Standards for Teacher Education ❑ Seminar B~Enhancing Learning through Technology
10 - 10:30 a.m.	Break
10:30 - Noon	Business Meeting ❑ Committee reports~Research, Program Improvement, Professional Development, Communications ❑ Elections~Vice-President, Alternative Vice-President, Treasurer, Research Committee (1999-2002), Program Improvement (1999-2002), Professional Development (1999-2002), Communications (1999-2002)

Concurrent Sessions

Session A: Agriculture Literacy & 4H

Paper #1: *Ohio 4-H Agents' Perceptions of the Level of Importance and Frequency of Use of the Eighteen Components of the Gems Model of Volunteer Administration*

Presenters: Catherine A. Deppe and Ken Culp, III, Ohio State University

Paper #2: *Charting a Course for Education in Michigan: Comparing Elementary and Middle School Teachers' Perceptions of and Ideas About the Agri-Food System with System Stakeholders*

Presenters: Cary Trexler, Thomas R. Johnson, and Kirk Heinze, Michigan State University

Paper #3: *Comparison of Elementary Teachers' Use of Agriculture in Their Teaching*

Presenters: Anissa Wilhelm, North Dakota State University and Robert Terry, Jr., Oklahoma State University

Chairperson: Allen Talbert, Purdue University

Discussant: Greg Miller, Iowa State University

Facilitator: Shannon Washburn, Kansas State University

Session B: Web-based Instruction and the Internet

Paper #1: *Relationships Among Students Learning Styles, Motivation, Attitudes, and Achievement in Web-Based Courses*

Presenters: Ching-Chun Shih and Julia Gamon, Iowa State University

Paper #2: *Agriculture Teachers' Use of the Internet: Facilitating Factors*

Presenters: K. Dale Layfield, Iowa State University and Dennis C. Scanlon, The Pennsylvania State University

Paper #3: *Secondary Agriculture Instructor's Opinions and Usage of a Telecommunications Network for Distance Learning.*

Presenters: Gregory S. Miller and W. Wade Miller, Iowa State University

Chairperson: Earl Russell, University of Nebraska

Discussant: Rosemary Gliem, The Ohio State University

Facilitator: Jamie Castillo, The Ohio State University

Session C: Distance Education

Paper #1: *Cognitive Levels of Instruction in Agricultural Distance Education Courses*

Presenters: Greg Miller and Carol L. Pilcher, Iowa State University

Paper #2: *Perception of Students and Faculty Regarding The Academic Rigor of On- and Off- Campus Agriculture Courses*

Presenters: Greg Miller and Carol L. Pilcher, Iowa State University

Paper #3: *Off-Campus Students and Agriculture Teaching Faculty Perceptions of the Quality of On- and Off-Campus Courses*

Presenters: Greg Miller and Carol L. Pilcher, Iowa State University

Chairperson: Richard Joerger, University of Minnesota

Discussant: Kirby Barrick, University of Illinois, Urbana

Facilitator: Ching-Chun Shih, Iowa State University

Session D: Teaching, Achievement & Retention in Undergraduate Education

Paper #1: *Predictors of Student Retention in Colleges of Agriculture*

Presenters: James E. Dyer, University of Missouri and Lisa M. Breja, Iowa State University

Paper #2: *Predictors of Student Achievement in an Introductory Agricultural Economics Course*

Presenters: Bryan L. Garton, Jan L. Dauve, and Robin W. Thompson, University of Missouri

Paper #3: *The Relationship Between Learning Styles, Teaching Performance, and Student Achievement in an Introductory Animal Science Course*

Presenters: Bryan L. Garton, James N. Spain, William R. Lamberson, Donald E. Spiers, and William E. Trout, University of Missouri

Chairperson: Mark Blaschweid, Purdue University

Discussant: Joe Gliem, The Ohio State University

Facilitator: Dexter Wakefield, Purdue University

Session E: Experiential Learning

Paper #1: *Educational Experiences and Academic Achievement of Rural, Suburban, and Urban Students*

Presenters: Michael D. McDermott, Morehead State University and W. Wade Miller, Iowa State University

Paper #2: *Integrating Experiential Learning Into A Capstone Course: A Proposed Model*[1]

Presenters: Randall J. Andreasen and Larry D. Trede, Iowa State University

Paper #3: Perceived Benefits of Selected Experiential Learning and Instructional Techniques in a College of Agriculture Capstone Course at Iowa State University

Presenters: Randall J. Andreasen and Larry D. Trede, Iowa State University

Chairperson: Anissa Wilhelm, North Dakota University

Discussant: Steve Harbstreit, Kansas State University

Facilitator: Carol Pilcher, Iowa State University

Session F: Secondary Agricultural Education

Paper #1: *Attitudes of Agriculture Teachers, Teacher Educators, and State Staff Toward Recruitment*

Presenters: Lisa M. Breja, Iowa State University and James E. Dyer, University of Missouri

Paper #2: *Attitudes of Star Academy Agricultural Science and Business Students Toward Agriculture*

Presenters: B. Allen Talbert, Purdue University

Paper #3: *A Comparison of Stakeholder Beliefs Concerning The Farm Safety Training Needs of Youth*

Presenters: Richard Joerger, University of Minnesota, and Jerry Ferguson, Utah Farm Bureau

Paper #4: *A Meta-Analysis of Ohio Agriculture Teachers' Level of Job Satisfaction*

Presenters: Jaime Castillo, Jaime Cano, The Ohio State University

Chairperson: Dale Layfield, Iowa State University

Discussant: Clark Hanson, South Dakota State University

Facilitator: Jim Riley, University of Missouri

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[1]Journal Paper No. J-17936, of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa, Project No. 3374, and supported by the Hatch Act and State of Iowa Funds.

Reviewer Acknowledgements

Reviewers from the AAAE regions outside of the Central Region read the paper proposals as part of the blind review process. Independent recommendations and numerical ratings were examined to select papers for presentation.

Sincere gratitude is extended to the following individuals who served as external reviewers for the 1999 AAAE Central Region Research Conference and Seminar in Agricultural Education.

Henry Bahn	USDA
Gary E. Briers	Texas A&M University
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Jim Knight	University of Arizona
Alfred Manneback	University of Connecticut
Tim Murphy	Texas A&M University
Michael Newman	Mississippi State University
Don Peasley	New York
Matt Raven	Mississippi State University
Carl Reynolds	University of Wyoming
Mike Swan	Washington State University
Freddie Scott	University of Arkansas
Chris Townsend	Texas A&M University
Doug Ullrich	Sam Houston State University
George Wardlow	University of Arkansas
Randol G. Waters	University of Tennessee

Schedule for Future
AAAE Central Region Conferences

2000	Illinois
2001	Ohio
2002	Kansas
2003	Wisconsin
2004	Iowa
2005	Missouri
2006	North Dakota
2007	Nebraska
2008	Minnesota
2009	Indiana
2010	South Dakota
2011	Michigan

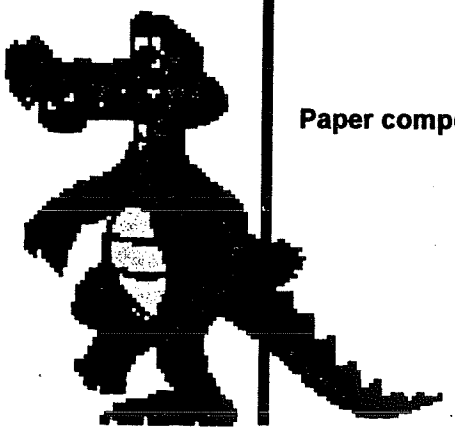
National Agriculture Education Research Conference

Orlando, Florida
December 11, 1999
(tentative)

"Call for Papers"

Specifications:

What to send	Four copies of the research paper *We will need a disk copy of papers once accepted for presentation (MS Word '97 or earlier version preferred).
Length	12-page maximum, excluding cover page *Single-spaced, 12-point Times New Roman
Margins	Left margin 1.5 inches, others 1 inch
Placement of tables and figures	Within the paper's body
Style reference	APA Publication Manual (4th Edition)
Deadline	Postmarked June 1, 1999 *FAX not acceptable
Send to	NAERC Agricultural Education and Communication P.O. Box 110540 University of Florida Gainesville, FL 32611-0540
Paper components	• Name, mailing address, phone number, FAX and email of author(s) on title page • Paper title (centered, all caps) on first page of paper • Introduction/theoretical framework • Purpose(s)/objective(s) • Methods/procedures • Results/findings • Conclusions/recommendations/implications • References



Ohio 4-H Agents' Perceptions of the Level of Importance and Frequency of Use of the Eighteen Components of the Gems Model of Volunteer Administration

Catherine A. Deppe
The Ohio State University

Ken Culp III
The Ohio State University

Introduction

The competition for volunteers will continue to grow as organizational budget constraints continue and the need for volunteer services expand. Volunteers will search for positions that will provide them with experiences they desire. With this in mind, administrators of volunteer-driven programs and agencies need to consider the most appropriate ways to manage volunteer programs in order to maximize volunteer contributions to the organization.

Several volunteer administration models have been developed and utilized by volunteer coordinators. These models include: ISOTURE (Boyce, 1971; Dolan, 1969), the Bridge from Dreams to Reality (Vineyard, 1984), the Volunteer Professional Model for Human Services Agencies and Counselors (Lenihan & Jackson, 1984), the Volunteer Management Cycle (Lawson & Lawson, 1987), 4-H Volunteer Leadership Development Program (Kwarteng, Smith, & Miller, 1988), L-O-O-P (Penrod, 1991), and the GEMS Model of Volunteer Administration (Culp, Deppe, Castillo, & Wells, 1998).

The GEMS Model of Volunteer Administration (Culp, et al., 1998) was utilized as the theoretical framework for this study. GEMS addresses current and emerging needs of volunteer administrators and is a comprehensive model that can be utilized by volunteer administrators to provide a framework for their volunteer-based programs.

Volunteer administration is a rapidly growing and evolving field. "Volunteer administrators will need to strategically position themselves for dynamic audiences and clientele, as well as a changing volunteer base, in order to serve the needs of society in the next century. Innovative programs should be implemented which will anticipate and meet these evolving needs. Therefore, the tools and technologies which volunteer administrators use to manage and develop programs for these changing audiences will need to evolve for the Third Millennium" (Culp, et al., 1998). Building on aspects of previous models, the GEMS Model (Culp, et al.) was conceptualized and developed. GEMS is depicted in a spiral, illustrating that volunteer administration is a cyclical, ongoing process. The GEMS Model consists of four broad categories which include: Generate, Educate, Mobilize, and Sustain. The four categories comprise a total of 18 phases. "The Generate category consists of an organizational needs assessment, writing job descriptions, identifying, recruiting, screening, and selecting. The Educate phase includes orienting, protecting, providing resources, and teaching. Mobilize includes engaging, motivating, and supervising. The Sustain category contains evaluating, recognizing, and redirecting, retaining or disengaging" (Culp, et al.).

Purpose and Objectives

The purpose of this study was to explore and describe how 4-H Youth Development Agents in Ohio perceive the level of importance and the frequency of use of each phase outlined in the GEMS Model of Volunteer Administration. 4-H Youth Development Agents utilize volunteers to achieve 4-H programmatic goals. The discrepancy, or difference,

between the perceived level of importance and the frequency of use yields the perceived need and provides a framework for determining which phases of the volunteer administration model should be emphasized in staff development and educational in-servicing to increase volunteer administrators' knowledge or performance in these areas.

The objectives of the study were to: (1) to demographically describe Ohio 4-H Youth Development Agents; (2) to explore and describe how Ohio 4-H Youth Development Agents perceive the level of importance of each of the 18 identified phases and four categories of volunteer administration; (3) to explore and describe how Ohio 4-H Youth Development Agents perceive their frequency of use of each of the 18 identified phases and four categories of volunteer administration; (4) to determine the discrepancies that exist between 4-H Agents' perceptions of the level of importance and frequency of use of the 18 identified phases and four categories of volunteer administration; (5) to determine if populational parameters relate to the perceptions held of the importance and frequency of use of the 18 identified phases and four categories of volunteer administration.

Procedures

This survey research was conducted utilizing mail questionnaires during February and March, 1998. The purpose of this study was to explore and describe how Ohio 4-H Youth Development Agents (volunteer administrators) perceived the level of importance and frequency of use of the 18 phases outlined in the GEMS Model of Volunteer Administration (Culp, Deppe, Castillo, & Wells, 1998). These phases include needs assessment, job description, identifying, recruiting, screening, selecting, orienting, protecting, providing resources, teaching, engaging, motivating, supervising, evaluating, recognizing, redirecting, retaining, and disengaging.

The target population for this census was identified as 4-H Youth Development Agents in Ohio. The frame of the study was obtained from the 1997 OSU Extension personnel directory. The population includes 102 4-H Youth Development Extension employees in 88 Ohio counties.

Eighteen areas of volunteer administration were identified in the conceptual GEMS Model of Volunteer Administration (Culp, et al., 1998). Based on a review of related literature and discussions with faculty members at The Ohio State University, the Volunteer Administration Questionnaire was developed.

Statements pertaining to each of the 18 volunteer administration components were presented. Individuals in the population were asked to indicate the level of importance and their frequency of use for each of the identified phases in carrying out their duties as a volunteer administrator by circling the appropriate corresponding number on an eight point Likert-type scale.

A panel of experts was used to ascertain the content validity of the instrument. The panel included researchers and experts in the field of volunteerism and research methodology from the Departments of Agricultural Education and 4-H Youth Development at The Ohio State University. Samples of the research instrument were submitted to each of the experts for their review and comments.

To establish internal consistency reliability, the research instrument was pilot tested among a sample (N=44) of 4-H Youth Development Extension Educators in Indiana with a response rate of 59% (n=26). Test results from pilot testing the instrument were subjected to the reliability analysis program (Cronbachís Alpha) to establish the instrument internal consistency reliability coefficients. Questionnaire items which yielded an alpha level below .70 were modified and retested among the respondents of the initial questionnaire (n=21). Test results from the instrument were again subjected to reliability analysis. Results are reported in Table 1. These were deemed acceptable as they exceeded Nunnallyís (1967) recommendation of .5 to .6 for initial stages of instrument development.

Table 1: Summary of instrument internal reliability by volunteer administration category.

Volunteer Administration Category	Number of Items	Cronbach's Alpha Reliability Coefficient Level of Importance	Cronbach's Alpha Reliability Coefficient Frequency of Use
Generate	24	.73	.70
Educate	16	.88	.84
Mobilize	12	.92	.89
Sustain	20	.92	.88

The data for this study were collected by mail questionnaire during February and March, 1998, utilizing the total design method as outlined by Dillman (1978). Questionnaires were mailed to the population on February 23, 1998. To ensure an adequate and complete response from 4-H Youth Development Agents participating in the study, a cover letter encouraging them to cooperate with the study by completing and returning the questionnaire was enclosed with each questionnaire. Also enclosed was a stamped, self-addressed return envelope to be used in returning the completed questionnaire to the researcher.

A total of 63% (n=64) of the questionnaires were initially returned by the 4-H Youth Development Agents. A reminder postcard was mailed to nonrespondents two weeks after the initial mailing. This yielded an additional 6% (n=6) questionnaires.

A follow-up questionnaire, cover letter and a stamped, self-addressed return envelope were mailed to all nonrespondents three weeks after the first mailing. Any questionnaires received more than ten days after the final mailing were not utilized. An additional 11% (n=11) questionnaires were returned by 4-H Youth Development Agents.

To aid in controlling non-response bias, a comparison of early respondents and late respondents was utilized to determine differences between the two groups. "With late respondents assumed typical of nonrespondents, if no differences are found, then respondents are generalized to the sample. If differences are present, data are weighted proportionately for determining the statistics to describe the sample" (Miller & Smith, 1983).

Finding no significant differences between the early and late respondents, all of the questionnaires were combined. The combined questionnaires yielded a total 79% (n=81) response rate from the 4-H Youth Development Agents. Three (3) questionnaires were not usable because they were returned without having been completed. These questionnaires were not utilized in the data analysis.

Analysis of Data

Measures of central tendency, percentage distributions, and frequencies were computed to describe demographic parameters related to the population of Ohio 4-H Agents.

To explore and describe how Ohio 4-H Youth Development Agents perceive the level of importance and frequency of use of each of the 18 identified phases of volunteer administration, the following anchored Likert-type scale was used. A value of 8 was assigned to "Essential," 7 was assigned to "Extreme Importance," 6 was assigned to "High Importance," 5 was assigned to "Moderate Importance," 4 was assigned to "Some Importance," 3 was assigned to "Slight Importance," 2 was assigned to "Negligible Importance," and 1 was assigned to "No Importance". The mean, median, standard

deviation, range, and frequencies were computed to describe the perceptions of the level of importance and frequency of use held by 4-H Agents in each of the 18 phases and four categories.

The Borich model (1979) was utilized to calculate the differences between perceived level of importance and frequency of use. The Borich model determines needs scores by subtracting the perceived performance (or use) score from the perceived importance score, and then multiplying the result by the mean perceived importance score. (Importance - Use) * μ Importance = Needs Score.

Pearson correlation coefficients were calculated to compare continuous parameters with the 18 phases and four categories in the GEMS Model. Point biserial correlation coefficients were calculated to compare discrete parameters with the 18 phases and four categories in the GEMS Model. Spearman rank order correlations were calculated to compare ordinal parameters with the 18 phases and four categories of the GEMS Model.

Results

The findings of this survey research study are presented according to each of the five objectives of the study.

The first objective of this study was to demographically describe Ohio 4-H Youth Development Agents. Demographically, the typical 4-H Agent in Ohio may be described as a 38 year old female who has completed a Masterís Degree. She has had nine years of experience as a 4-H Agent in Ohio, two years of experience in another state, and 12 years of experience as a volunteer administrator. The typical 4-H Agent previously served or was currently serving in six volunteer positions outside of Extension, and coordinates 271 volunteers annually. Youth Development was her chosen area of specialization. The county in which she works is rural and she was previously involved as a 4-H member/participant for eight years.

The second, third, and fourth objectives of this study were to explore and describe how Ohio 4-H Youth Development Agents perceive the level of importance, frequency of use and to determine the discrepancies (perceived need) that exist between 4-H Agentsí perceptions of the level of importance and frequency of use of the 18 phases and four categories of volunteer administration.

Table 2 summarizes the mean and rank of each of the 18 of the GEMS Model phases based on the perceived level of importance, frequency of use, and calculated needs score for each phase of volunteer administration. Volunteer Administrators indicated the three phases of greatest importance to be from the Educating category, these include Orienting (mean=6.98) followed closely by Protecting (mean=6.94) and Providing Resources (mean=6.91). Volunteer Administrators perceive Identifying (mean=5.47) as the least important phase. On an eight point, Likert-type scale, the mean level of importance for all 18 phases was 6.47. By virtue of the small range of importance scores (1.51), one could conclude that 4-H Agents identified all 18 phases as highly important or extremely important. As compared to importance, Administrators identified somewhat greater variation in use (range = 2.09). All 18 phases were used between sometimes and frequently.

The respondents indicated that they most frequently provide resources to volunteers (mean=6.68). Orienting (mean=6.65) was reported as the second most frequently utilized phase, and Selecting (mean=6.53) was the third most frequently utilized phase. Volunteer Administrators spend the least amount of time in Evaluating (mean=4.59) and Needs Assessment (mean=4.82).

The Borich Model (1979) was utilized to calculate the needs score for each phase where by (Importance - Use)*Importance=Needs Score. Three phases in the Sustaining category were identified as having the greatest need, these include Disengaging (mean=8.02), Retaining (mean=7.45), and Evaluating (mean=7.20). The lowest needs score was calculated for Providing Resources (mean=1.68). Agents perceived all 18 phases of the GEMS Model to be between "highly important" and "extremely important" (mean=6.47) with a range of 1.51. However, Administrators perceived greater differences in their application and use of the 18 phases as identified by a greater variation of Use Scores

(mean=5.80, range=2.09). Finally, the greatest variation was observed in the mean Needs Scores (mean=4.24, range=6.34).

Table 2: Mean and rank for perceived level of importance, frequency of use, and calculated needs score for each phase of volunteer administration.

Phase	Level of Import. Mean	Level of Import. Rank	Freq. of Use Mean	Freq. of Use Rank	Mean Needs Score	Needs Score Rank
Needs Assessment	5.73	17	4.82	17	5.17	5
Job Description	6.06	15	5.36	14	4.27	9
Identifying	5.47	18	4.97	15	2.68	14
Recruiting	6.42	12	5.86	9	3.48	11
Screening	6.83	4	6.35	5	3.28	12
Selecting	6.81	5t	6.53	3	2.02	17
Orienting	6.98	1	6.65	2	2.41	15
Protecting	6.94	2	6.16	8	5.41	4
Providing Resources	6.91	3	6.68	1	1.68	18
Teaching	6.78	7t	6.17	7	4.21	10
Engaging	6.56	9	6.19	6	2.39	16
Motivating	6.48	10t	5.80	10	4.43	7
Supervising	6.41	13	5.71	11	4.32	8
Evaluating	5.85	16	4.59	18	7.20	3
Recognizing	6.77	7t	6.38	4	2.70	13
Retaining	6.48	10t	5.70	12	5.14	6
Redirecting	6.13	14	4.89	16	7.45	2
Disengaging	6.81	5t	5.62	13	8.02	1
	Mean=6.47		Mean=5.80		Mean = 4.24	

The findings indicate that Volunteer Administrators perceive level of importance to be greatest for the Educate category (mean=6.89), followed by Mobilize (mean=6.48), Sustain (mean=6.41) and Generate (mean=6.20). 4-H Agents also indicated that frequency of use was greatest for the Educate category (mean=6.41), followed by Mobilize (mean=5.90), Generate (5.63) and Sustain (mean=5.44). The greatest discrepancy existed between the level of importance and level of use for the Sustain category with a calculated needs score of 6.10. The Mobilize category was found to have the second greatest needs score (3.71), followed by Generate (3.48) and Educate (3.43). Therefore, Ohio 4-H Youth Development Agents determined their greatest need for support to be in the Sustain category. Table 3 illustrates these findings.

Table 3: Mean and rank for perceived level of importance, frequency of use, and calculated needs score for each category of volunteer administration.

Category	Level of Import. Mean	Level of Import. Rank	Freq. of Use Mean	Freq. of Use Rank	Mean Needs Score	Needs Score Rank
Generate	6.20	4	5.63	3	3.48	3
Educate	6.89	1	6.41	1	3.43	4
Mobilize	6.48	2	5.90	2	3.71	2
Sustain	6.41	3	5.44	4	6.10	1

The fifth objective of this study was to determine if populational parameters relate to the perceptions held of the importance and frequency of use of the 18 phases and four categories of volunteer administration. The relationship between populational parameters and perceptions held of the importance and frequency of use of the 18 phases and four categories of the GEMS Model were described as either negligible associations or low associations in all cases.

Conclusions/Recommendations

The conclusions are presented according to each of the four categories of the GEMS Model of Volunteer Administration.

Generate

4-H Agents ranked the Generate category fourth in perceived level of importance and third in frequency of use. Based on the importance and use scores, the needs score was calculated and ranked third out of the four categories.

Generating new volunteers can be a very time consuming process involving many steps. Without a clear understanding of the number and type of volunteers needed in the program, the volunteer organization may suffer from lack of volunteer assistance. Individuals are not likely to volunteer without a clear understanding of their duties, thus, assessing the needs of the program and developing job descriptions is critical. Because the Needs Assessment phase ranked seventeenth for both importance and use by 4-H Agents, they may not understand the importance of seeking input from the community, and volunteers within the program, as they carry out their volunteer administrative duties. Also, Extension Agents may view needs assessments as a formal and time consuming process. Agents would benefit from learning about the importance of needs assessments and a variety of ways in which they can be conducted. If a formal assessment is desired, samples of questionnaires or other techniques would be helpful to Agents that do not have the time or resources to create one for their program

While job descriptions are often developed for volunteers, they are not always utilized. 4-H Agents ranked the importance of job descriptions higher than their frequency of use. These findings may indicate a classic example of having job descriptions on file, but not utilizing them at the appropriate time. Additional resources may not be as necessary, however, Agents may need a better understanding of how to utilize the written job descriptions they have developed.

4-H Agents usually do not identify specific individuals or groups who may serve as volunteers for 4-H, nor do they feel that it is important to do so. Without understanding how beneficial the Identifying phase may be, Agents may experience difficulty locating sources of volunteers. Ohio 4-H Agents would benefit from a peer generated list of potential groups who may be willing to serve as 4-H volunteers. Such a list would give 4-H Agents new ideas for who they may contact within their community. In addition, Agents could gain from learning the importance of identifying diverse groups of volunteers that resemble the diverse characteristics of the communities 4-H serves.

Ohio 4-H Agents indicate that they continuously recruit new 4-H volunteers; however, their recruitment efforts do not always target likely candidates. By utilizing the Identifying phase, targeted recruitment becomes much easier. The calculated Needs Score for the Recruiting phase ranked eleventh among the 18 phases, therefore, the 4-H Agents do not perceive recruiting to be a great need. Although they may not perceive the need to be high, successful examples of mass and individual recruitment techniques would be helpful to Agents.

Screening potential volunteers was perceived by 4-H Agents to be the most important phase within the Generate category. This survey research reflected a low Needs Score by 4-H Agents in the area of screening volunteers. References related to interviewing techniques including the appropriateness and legal issues related to interview questions would prove to be beneficial to 4-H Agents.

Once the applicants have proceeded through the Screening phase, selecting the most qualified applicant for the position is the next step. Ohio 4-H Agents ranked Selecting fifth in importance and third in frequency of use among the 18 phases. The calculated mean Needs Score ranked seventeenth. Therefore, Agents perceive the Selecting phase as being important and also utilize the phase frequently in their county 4-H program. While additional resources or education may not be a necessity, 4-H Agents may need support on an individual basis from district personnel and state 4-H Extension Specialist when dealing with difficult situations involving volunteer selection.

Educate

Ohio 4-H Agents' mean ranking for both level of importance and frequency of use for the Educate category ranked first. The mean rank of the calculated Needs Score, therefore, was last. At the time this research was conducted, February and March, many 4-H Agents are typically conducting activities related to the Educate category. The fact that they were carrying out those duties at the time the research was conducted may have been a factor in how they rated the importance and frequency of use for those phases.

The mean importance score of the Orienting phase ranked first among the 18 phases. Frequency of use ranked second with a mean Needs Score rank of fifteen. This indicates that 4-H Agents perceive orienting volunteers to be important, and they are also utilizing the phase. While the results show that Agents are conducting some sort of orientation with new volunteers, the orientation format or the effectiveness of the orientation program is unknown. Although the Needs Score for this phase was low, Agents could still benefit from orientation reference materials to use with their volunteers. Included should be how 4-H on the county level fits into the larger picture of OSU Extension and 4-H on a national level.

The Protecting phase ranked second in terms of importance, eighth in frequency of use, and fourth in need. 4-H Agents understand the importance of protecting volunteers by making them aware of appropriate behaviors, risk management procedures, and liability issues. However, Agents may not have a good understanding of how to inform volunteers about those issues. Agents may not understand the legality of many issues, or feel comfortable discussing legal issues with the volunteers in the program. District and state personnel first need to educate 4-H Agents on liability issues when dealing with volunteers and youth, and then need to provide support for county programs such as meeting with groups of volunteers to discuss protection issues.

Providing resources to volunteers was ranked third in importance, first in frequency of use, and eighteenth in need by Ohio 4-H Agents. Questionnaire items related to providing volunteers with written sources of information received high scores, however, 4-H Agents do not do as well with providing volunteers with monetary resources, or information about how volunteers can seek funding for 4-H at the county level. Agents also indicated that they do not as frequently provide volunteers with sources of other individuals that may serve as resources for the program. A list compiled by 4-H Agents around the state of agencies or individuals that volunteers could use as resources would be beneficial and increase the frequency of use of those areas within the Providing Resources phase.

The Teaching phase was seen as relatively important compared to the other phases, and the Needs Score ranked tenth among the 18 phases. County programs frequently have organized procedures for teaching volunteers. However, Agents less often utilize a variety of teaching methods for the programs offered or solicit input from volunteers when

planning educational opportunities. Agents would gain from sharing ideas with other Agents from around the state about educational programs that have been successful and what aspects made the programs successful. In addition, Agents may benefit from information on various learning styles and techniques that could be utilized when teaching individuals with different styles.

Mobilize

Overall, the 4-H Agents' rank of the level of importance and frequency of use for the Mobilize category was second among the four categories. The Needs Score also ranked second. Agents perceive the category as being important, and although they are utilizing the category, a discrepancy exists creating the second highest need for further education and resources.

Questionnaire items related to Engaging volunteers in the duties they were selected to perform indicated that while 4-H Agents do well delegating authority to the volunteers to complete tasks, volunteers are less often provided with new challenges and opportunities or have their volunteer responsibilities increased gradually. Ohio 4-H Agents should be instructed to engage volunteers in a role in which they feel comfortable and gradually increase their duties as they become familiar with the program policies and procedures. Serving in an assistant position can often be helpful before carrying out volunteer duties individually.

Motivating 4-H volunteers is a concern for Agents, as it ranked seventh in Needs Score. Understanding what motivates individuals to begin and continue their volunteer duties is beneficial to 4-H Agents. Research studies conducted to explore motivational factors for 4-H volunteers should be shared with Agents and suggestions should be given on how Agents can utilize the motivating factors to increase motivation among volunteers within the county 4-H program.

The Supervising phase is important to insure the quality of the program and that volunteers are performing in an acceptable manner. 4-H Agents do not utilize this phase as much as they would like, as there is a discrepancy between the level of importance and frequency of use scores. Individual supervision of all volunteers cannot be accomplished with the limited supply of time and resources most Agents face. Agents reported a mean of 271 volunteers coordinated annually within the county program. Therefore, 4-H Agents may need to rely on volunteer middle managers, parents, and 4-H members to serve in supervisory roles and in turn report to the 4-H Agent.

Sustain

Sustaining volunteer involvement will lead to strength, stability, and continuity of the program in which they serve. Ohio 4-H Agents indicated that they least frequently utilize phases within the Sustain category and perceive the greatest need for additional education and resources in this category.

Evaluating volunteers on a continuous basis can be extremely time consuming and a difficult task for volunteer administrators with several hundred volunteers. Evaluating volunteers ranked third in need by 4-H Agents. Although evaluations are often used to determine if programmatic goals are being met, Agents less frequently determine if volunteers' goals are being met. Nor do evaluations focus on the contributions made by volunteers or include the volunteers in their own evaluation. Samples of formal evaluations that focus on the strengths and weaknesses of the volunteer in addition to the program would be beneficial to 4-H Agents. In addition, 4-H Agents could benefit from learning ways to informally evaluate the work of volunteers through feedback from program participants.

Recognition often serves as a form of motivation for volunteers. Volunteers may continue to serve because they are told they are doing well and are making a difference. Agents indicated through a relatively low needs score that they perceive they are doing well in the area of recognition. However, Agents may gain new ideas for both formal and informal volunteer recognition from their peers. Each county 4-H program may have different methods of recognizing volunteers. Sharing those ideas among counties may help all Agents find new ways to recognize volunteers for their service leading to greater volunteer motivation and retention.

4-H Agents indicated that they only sometimes have a plan for volunteer retention. Volunteer retention will lead to continuity within the program. Retention can be accomplished by maintaining a good relationship between 4-H, the

4-H professional (volunteer administrator) and the volunteer, and asking volunteers to renew their commitment to serve the program regularly. Agents first need to determine a retention goal for the county program, and then develop methods to reach their goal. Planning for retention, rather than just letting it happen by chance, will likely increase the number of volunteers who renew their volunteer commitment and continue to serve 4-H on an annual basis. Agents indicated the second greatest need in the Redirecting phase. Volunteers within the 4-H program are often promoted to positions with greater responsibility, however redirection is less often utilized to move a volunteer from an unsuccessful position to another volunteer position within the 4-H program. Agents may be apprehensive about moving a volunteer from one particular position to another for fear they may leave the organization entirely. Agents may also be concerned about maintaining a positive relationship with the volunteer after such redirection. Support and direction should be given to 4-H Agents in the event that they Redirect or transfer an unsuccessful volunteer to another position within the 4-H program. Agents would also benefit from learning how to use Redirecting and promoting volunteers to manage their volunteer program.

The Disengaging phase of volunteer administration is often viewed negatively by volunteer administrators and avoided whenever possible. 4-H Agents are no exception. Ohio 4-H Agents indicated the greatest need in this phase. While Disengaging ranked fifth in terms of importance, the frequency of use rank was thirteenth. Positively, 4-H Agents may not be utilizing the Disengaging phase very often because retention is high in the program. However, all volunteers will at some time disengage from the organization. Agents should remember that leaving the organization is a natural phase in the relationship between 4-H and the organization, and volunteers that resign from their position should leave with a positive feeling toward the organization and their involvement. Volunteers who are dismissed from their position due to problematic behaviors should have been made aware of dismissal policies at the beginning of their service, during orientation. Agents would greatly benefit from learning their rights, responsibilities, and proper procedures to follow related to volunteer dismissal. Support is often needed from district and state specialists in the event that an Agent must terminate a volunteer's involvement in 4-H program.

In addition to the specific recommendations for each phase previously described, the researcher offers the following general recommendations as a result of the survey research conducted.

1. Ohio 4-H Youth Development Agents could benefit from educational opportunities, resource materials and support in each of the 18 phases of volunteer administration. Emphasis should first be placed on developing and revising resource materials for the phases receiving the greatest Needs Scores. Materials should then be distributed to Agents with support provided at the district and state level. The rank order of greatest need based on mean Needs Score was: Disengaging, Redirecting, Evaluating, Protecting, Needs Assessment, Retaining, Motivating, Supervising, Job Description, Teaching, Recruiting, Screening, Recognizing, Identifying, Orienting, Engaging, Selecting, and Providing Resources. An effective method of developing these resources would be to organize them by category as outlined by the GEMS Model of Volunteer Administration.
2. Demographic characteristics of 4-H Agents need not be of concern as educational opportunities or resources are developed, as no moderate or strong relationships existed between any demographic variable and any phase or category.
3. No indication was made as to the effectiveness of the 4-H Agents' volunteer administration practices. Further studies could investigate the effectiveness of the volunteer administration practices utilized by 4-H Agents in each of the 18 phases of the GEMS Model. Such studies would indicate how well 4-H Agents are doing in these areas in addition to how often these practices are utilized.
4. While the relationships between populational parameters and each of the 18 phases and four categories were found to be negligible or low, further studies could investigate the relationships among the phases of volunteer administration for perceived importance, use and need of each of the phases.
5. A replication of this study may determine if 4-H Agents perceive the importance and their frequency of use differently at another time within the 4-H year.

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A Critique By:
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Ohio 4-H Agents' Perceptions of the Level of Importance and Frequency of Use of the Eighteen Components of the gems Model of Volunteer Administration

This paper makes a practical contribution to the literature in agricultural education by introducing a useful volunteer administration model. The detailed discussion of the model in the conclusion and recommendations section provided a sufficient description of what the model consists of and how each of the phases might best be achieved. The procedures used in conducting the study were thoroughly described and generally appropriate. I was especially impressed by the high response rate that was likely achieved as a result of the carefully planned data collection procedures. The author(s) may find the following questions and comments to be useful in future revisions of the paper.

I don't think that a case was made in the introduction for doing this particular study. The introduction basically indicates that several models of volunteer administration have been developed and gives a very brief description of the GEMS model that was described as the theoretical framework for the study. With regard to nonresponse error, I don't think that it is sufficient to say that early and late respondents were compared and no significant differences were found. How was membership in the late respondent group defined? What variables did you look at to determine if differences existed? The author(s) wrote that "questionnaire items which yielded an alpha level below .70 were modified and retested." Is it possible to calculate a Cronbach's alpha coefficient on one item.

The formula that was used to calculate needs involved perceived level of importance and frequency of use. Why does the formula yield a valid measure of need? Would a formula that involves level of importance and individual competence result in a more valid measure? Could it be that a particular phase is used less simply because it requires less time, not necessarily because the respondent is not competent in implementing the phase? Relatedly, how was frequency of use measured? I believe that somewhere it was mentioned that an eight-point scale was used but descriptors for each point on the scale were never given.

While I appreciate the detail in the conclusions and recommendations section for its contribution to my understanding of the model, I believe that the author(s) reported additional findings in this section and the conclusions went beyond what the findings can support. In one instance the author(s) wrote that "without understanding how beneficial the identifying phase may be, agents may experience difficulty locating sources of volunteers." Does this contradict an earlier conclusion that all 18 phases were identified as highly or extremely important? In another instance the author(s) wrote that "the 4-H Agents do not perceive recruiting to be a great need. Although they may not perceive the need to be high, successful examples of mass and individual recruitment techniques would be helpful to agents." There are other similar statements that lead me to wonder why you would conduct the needs assessment only to conclude that the respondent perceptions are incorrect?

Charting a Course for Education in Michigan: Comparing Elementary and Middle School Teachers' Perceptions of and Ideas about the Agri-Food System with System Stakeholders

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In the early 1990's the Michigan Integrated Food and Farming System (MIFFS) was launched as part of the 18-state W.K. Kellogg Foundation's "Integrated Farming Systems" program. MIFFS was formed as an organization of individuals working to create and support healthier food and farming systems. While pursuing this goal, frustrations led many MIFFS members to believe that most of society lacks a basic understanding of how food is produced and therefore, does not value a sustainable agri-food system. During meetings in the summer of 1997, MIFFS' members suggested that increased agri-food system education in the schools was needed before society could make more informed choices about the food they consume.

These suggestions are similar to the National Academy of Sciences (1988) assertion that agriculture is too important to be taught to students only in vocational education; it urged that more agriculture be taught in the country's schools. Agricultural educators advocate a broader role for agricultural concepts and examples in U.S. public school curricula . (Trexler and Miller, 1992; Leising and Zilbert, 1994; Birkenholz, Frick Gardner, and Machtmes, 1994; Frick, Birkenholz, and Machtmes, 1995). Vanhoviak and Etling (1994) extend the discipline even further by suggesting that "agricultural education, with linkages to environmental education, could foster an educational philosophy with global sustainability as its focus" (p. 13).

Leising and Zilbert (1994) identified a lack of statewide systematic planning to provide direction in developing curriculum about the food and fiber system. Nurturing support for development of and agreement upon curricular goals is a political process. Marris (1974) suggests that curriculum development requires the involvement of the multiple stakeholders to promote ownership of the innovation.

Frameworks

This study's theoretical framework calls upon insights from the fields of sociology of knowledge, cognitive anthropology, and linguistics. Mannheim (1929) argues that "there are modes of thought which cannot be adequately understood as long as their social origins are obscured" (p.1). Humans, as social beings, use "language as the primary shaper of meaning" (Fine, 1990, p. 129). Considering these perspectives, two forms of a focus interview (Merton, Fiske & Kendall, 1956) were employed for the study of two distinct groups: agri-food system stakeholders and elementary and middle school teachers. These interviews provided a forum to ascertain beliefs and ideas in a social milieu. These techniques employed discourse analysis (Tannen, 1989) to interpret meaning of participants as they talked about their ideas about and impressions of topics and questions.

This study's conceptual framework involved two phases. In the first, stakeholder groups - representing agricultural commodity associations, farmers, environmentalists, nutritionists and health educators - met in roundtable meetings. In groups, they discussed: 1) their perceptions of the agri-food system and 2) the role formal education should play in helping people develop agri-food system literacy. In the study's second phase, focus group interviews sought teachers' perceptions relative to these two general lines of questioning.

Purpose and Objectives

This study's purpose is to form recommendations for agri- food system education programming in Michigan. To meet this purpose, the specific objectives were to:

1. Determine and compare agri-food system stakeholders' and 2-8 teachers' ideas about and perceptions of the U.S. agri-food system.
2. Ascertain and compare agri-food system stakeholders' and 2-8 teachers' perceptions of the importance of agri-food system education.
3. Identify agri- food system topics and subject matter being taught by 2-8 teachers and compare this with stakeholders' beliefs on what students should understand regarding the agri-food system.
4. Determine and compare where agri- food system stakeholders and 2-8 teachers believe the public currently obtains information about food and the agri-food system.

Methods and Procedures

This study employed two different forms of a focused interview, a structured roundtable and focus group. Roundatables were chosen because of the large size of the stakeholder groups, the diversity of suspected perspectives, and expense. Teachers, on the other hand, met in traditional focus groups (Krueger, 1994). These focus groups were homogeneous to facilitate discourse and to provide for practical logistics and management.

Population

Stakeholders

The population for the stakeholder portion of this study represented the extremes of Michigan's agri-food system. Participants included: farmers; agricultural, extension, environmental, and health educators; agricultural commodity, food and nutrition organizational representatives; academics with agri-food interests; agricultural agency employees; and nonprofit and food security staff. Ninety-three (93) stakeholders were purposively selected and mailed invitations to attend one of the two roundtable discussions. In total, twenty (20) people attended the first roundtable and eighteen (18) the second. Attendees were offered a $20 honorarium, although few accepted.

Teachers

The population for the teacher portion of this study was all 2-5th grade teachers and 6-8th grade teachers of science and social science in three (Ingham, Clinton and Eaton) contiguous counties surrounding Michigan's capital city, Lansing. This totaled over 3,000 elementary and middle school teachers. Second through fifth grade teachers were selected because they often teach in self contained classrooms and are responsible for all subjects, while science and social studies teachers were selected because the researchers believed they were more likely to teach about the agri-food system than other subject matter specialists.

Focus group participants were randomly selected from the three counties. Because the counties differed in their populations and geographic make up, the researchers determined the proportionality of each county's schools composing the total population meeting the elementary and middle school criteria. Based upon this criteria, a sample of 32 schools (70%) was selected from urban and suburban Ingham country, 6 schools (13%) from suburban and rural Clinton county, and 8 schools (17%) from suburban and rural Eaton county. Once sample schools were selected, teachers meeting the elementary and middle school parameter were selected randomly.

This process resulted in eighty (80) 2nd-8th grade teachers. In four schools (3 in Ingham and 1 in Eaton), researchers were unable to obtain any names for invitation; the missing schools were either private schools or public school academies. Invitations were mailed to all 80 teachers asking them to attend one of three evening focus groups scheduled between March 31 and April 2. To provide an incentive for participation (Krueger, 1994), teachers were offered a $50 stipend for participation and dinner. Those interested were asked to mail in a reservation post card.

As with all focus groups, attendance is voluntarily fueled by personal interest. In this case, the three focus groups ran with 7, 6 and 9 teachers participating respectively. Krueger (1994) suggests focus group size should range from 4 to 12 participants. It should be noted that - although researchers sought to select a representative sample of teachers based upon the geographic locale of the schools - 47% of the teachers interviewed came from rural schools, 39% from urban, and 13% from suburban schools.

Data Collection

Roundtables and focus groups interviews were audio taped and transcribed, serving as the primary data sources. Field notes and any products created by the participants were consulted as secondary data.

Stakeholders

The two 90-minute roundtables were structured as iterative processes to detect patterns and trends across the groups; this also served to increase the chances for a saturated response (Strauss, 1987). Participants broke into small groups of four to six people and were asked, as a group, to respond to prepared questions. Time was allotted for group discussion and news print paper was provided for displaying small group ideas to the group as a whole. Once everyone had time to consider a question, a representative from each group reported to the whole. Following the group sharing, time was set aside for participants to react to another group's presentation and for the whole body to synthesize a final response.

Teachers

A series of three 90-minute focus groups were conducted to detect patterns and trends across the groups. These focus groups followed the procedures set forth by Krueger (1994).

Interview Protocol and Questions

Roundtable and focus group questions were structured around two areas: 1) conceptions of the agri-food system and 2) educational issues related to the agri-food system. Questions were designed to elicit multi-sentence discourse and were sequenced from general to specific so participants gained comfort as discussion progressed. To establish content validity, faculty from Michigan State University (MSU) Department's of Agricultural and Extension Education and Resource Development reviewed the questions. The questions are listed below:

1. When you think of the U.S. food system, what comes to mind?
2. Is it important for people to understand the food system? Why?
3. Where does the public get information about the food system?
4. What should be taught or what do you teach about the food and the food system?

Analysis of Data

Analysis of data followed the procedures set forth by Krueger (1994). Analysis involved three phases. First, researchers discussed each interview immediately after participant departed. This served to underscore the salient observations that surfaced. In addition, this debriefing provided an opportunity for impressions of each researcher to be heard.

In the second phase, two researchers individually compared raw data from roundtable and focus group transcripts to the secondary data sources (for the stakeholder group notes prepared on newsprint paper). To interpret meaning of participants as they talked about their ideas and impressions of topics and questions, discourse analysis was employed (Tannen, 1989). Strips of conversation from the raw interview data were axially coded to allow for reassembly into the essence of shared meaning (Strauss, 1987). Initial coding was shared between researchers to ensure inter-rater reliability. Changes or additions to coding schemes resulted from this cross-checking.

The final phase of analysis sought confirming and disconfirming evidence of patterns among groups and individuals (Miles and Huberman, 1984). This was accomplished by two procedures: 1) Researchers evaluated the extensiveness and frequency of the participant responses. When participants had great understanding of, were experienced with, or were excited about a given topic, they used many words (extensive discourse). Frequent responses across groups were taken to be most commonly held by participants. 2) Researchers analyzed the data based upon what was missing in the responses. Certain topics of conversation only infrequently or never surfaced during discourse.

Findings

Objective 1: Ideas about and perceptions of the U.S. agri-food system

Stakeholders

Stakeholders described the agri-food system as large and complex. They mentioned every almost every component of the food system, beginning with farmers and the products they produce to food processors, retailers and consumers. Several commented on the increased specialization and consolidation taking place in agricultural production, so that it more resembles a modern business than a traditional family farm. Likewise, stakeholders identified the increasingly global nature of the agri-food system. Fresh products are supplied all year and may be transported for thousands of miles to reach consumers. Others believed that farmers are getting less of the food dollar, while agribusinesses and processors are getting more.

Stakeholders are certain that the media shapes perceptions of the agri-food system. They reported on the increasing prevalence of food contamination scares in the news and the resulting lack of consumer faith in the agri-food system. Others, however, contrasted this perception with observations that America's food is healthy, efficiently produced, plentiful, safe and inexpensive.

Stakeholders also identified the "trade-offs," which they saw as the environmental consequences, which are outcomes from the producing and packaging of food. They see that several agri-food system practices result in soil degradation, pollution runoff, environmental concerns, and in over-packaged items which contributes to the waste stream. Some noted that current land use devalues agriculture in favor of development, while others were concerned that there are many that can neither afford nutritious meals nor the land to produce their own food. In fact, stakeholders thought that few people today know who produces their food - as the grocery store, for many, is their primary point of reference.

Teachers

Teachers initially associated the U.S. food system with the government inspection of food and with regulations that govern food safety. Government agencies such as the United States Department of Agriculture and the Food & Drug Administration were mentioned in each group. Closely related were recent news items that questioned America's food safety, such as "mad cow" disease and the Oprah Winfrey hamburger disparagement trial, meat packing expose's on "60 Minutes," e. coli in chicken and the recent importation of contaminated strawberries from Mexico into Michigan school lunch programs. Similarly, several expressed concern whether modern farming practices, such as chemical use and the antibiotics being fed to livestock were related to the earlier onset of puberty among their students, the increased incidence of allergy sufferers and high rates of skin cancer among farmers.

Nutrition was a secondary theme among teachers in describing the food system. The food pyramid and daily nutritional requirements were frequently mentioned. Teachers in all groups were quick to introduce fast food into their discussions and typically bemoaned the challenge between choosing taste and convenience over eating nutritious food.

While each focus group cursorily mentioned the system of production, processing, packaging, marketing and transporting of food products, discussion did not generally dwell on this aspect. Also, little time was spent discussing farms and farming.

Other interesting comments, which were not necessarily mentioned in all three focus groups include: the belief that food in America is very cheap, the decline of family farms and their replacement with corporate farming, the difference in diets and food accessibility between low-income and high income people, how we import seasonal food which the U.S. cannot grow throughout the year, and the trend toward more home gardening and organic food consumption.

Comparison

Teachers primarily see the food system in terms of food safety and nutrition education. They are not as familiar with the production and processing aspects of the food system, and possess only limited knowledge of these areas and certainly not enough to feel comfortable teaching them. In contrast, agri-food system roundtable participants were more likely to take a broader and more detailed view of the food system, especially the production aspects. They were acutely aware of the degrees of separation that now exist between the farm gate and the consumer. While stakeholders also noted food safety issues, they tended to view such problems as isolated and not representative of the system- although they were fearful that society did not see them in this light. Contrary to teachers, stakeholders were positive on the high levels of nutrition in the food system. Both groups linked several negative externalities to today's agricultural production system. While teachers traced the production methods to disruptions in human health, stakeholders saw a correlation with environmental contamination.

Objective 2: Perceptions of the importance of agri-food system education

Stakeholders

The stakeholders unanimously thought it very important that society understand where its food comes from. Many decried the "disconnectedness" which currently exists between people and the land. Roundtable participants supported the importance of agri-food literacy by highlighting societal and personal considerations in food-related choices.

Stakeholders linked current agri-food production system practices to local economies, the environment, land use and health. Therefore, they argued that understanding of where food originates can help consumers make better choices about the use of resources. Not only can they select food that is healthy and safe for themselves and their families, but they can support production practices which reduce waste, lessen environmental impacts and support local and state economies. Participants believed that if society is more conscious of agri-food system connections to their own lives, they can make informed choices about issues related to the U.S. agri-food system.

Teachers

The teachers' responses dealt primarily with food education and not with agri-food system education. All of the three focus groups were concerned that young people do not eat balanced meals and do not associate items in their diet- such as fruit-as being essential for good nutrition. Students, the teachers said, also fail to link good diets with general health and well-being. Teachers believed that food is seen by youth as entertainment rather than as a source of nutrition. Advertisers emphasize this image by marketing food products as being "fun" and "in" over being healthy. As a result, the educators wanted to teach their students how to make better choices about their food, including how to read nutritional labels.

Teachers perceived that students do not understand where their food comes from and may not even care how it arrives on grocery shelves. Specifically, they stated that youth tend not to realize that a hamburger comes from butchering a cow, nor may they even be able to recognize what are food animals. Likewise, the students are unable to identify a carrot as a vegetable or that poultry is another term for chicken. This is less true for rural students, who live next to farms (although not necessarily on farms) and whose parents are more likely to hunt and serve game at home. Two

different focus group respondents noted how this lack of connection to the land and to food producers results in a lack of respect and dignity for food.

Connections to the food system, however, do occur in a limited fashion. Some teachers in a history, economics or social studies may teach the role of agriculture in society. A few teachers mentioned that their past classes have taken field trips to farms, the Michigan Farm Bureau's Rural Education Day and to processors such as cider mills and maple syrup manufacturers. Only one teacher was concerned about urban sprawl and that the loss of farmers may affect how food will be produced in Michigan in the future.

Comparison

Both educators and roundtable participants agreed it is important that youth understand where their food comes from. Both groups believe food system education can help youth make more informed food choices, especially in health and nutrition. The two groups, however, had fundamentally different concepts on what is considered healthy consumption. Teachers saw healthy eating purely in terms of adequate nutrition and in avoiding foods high in calories and fats which possess little nutritional value. Stakeholders, on the other hand, associated healthy choices with knowledge of how the food was produced and processed. Stakeholders also viewed food system knowledge in sophisticated economic terms, believing that enhanced consumer knowledge would result in more locally-grown foods being purchased over those that are imported. Teachers, however, only sought a basic understanding of food origins and nutritional content. Both groups mentioned that youth should comprehend the agri-food system's linkages to environment.

Objective 3: Sources of agri-food system information

Stakeholders

Participants stressed the media's role in shaping perceptions about the agri-food system. Advertisements for food products, the nightly news and news magazine shows were the most frequently mentioned sources of information. However, they suggested that the media seldom presents information in an agri-food system context, but instead focus on problems. Several stakeholders thought that news coverage of the agri-food system was frequently negative as alarmist stories questioning food safety are commonly broadcast.

Stakeholders cited grocery stores and other food purchase sites as sources of agri-food system information, because it is there where consumers can read labels for nutrition and production information. However, they thought that it is primarily grocery store and fast food advertising that influence what most people decide to eat.

Schools were also identified as sources of agri-food system information and teachers were recognized as playing a vital role in delivering that information. Stakeholders, however, did not elaborate what students learned about the agri-food system at school.

Other sources of agri-food system information that stakeholders detailed dealt primarily with health and nutrition such as through dieting books, nutrition workshops and physician and health provider visits. Several stakeholder groups stressed family and peer influences as contributing to what foods people choose to eat.

Participants observed that the question isn't where people get their information about the agri-food system, but what is the quality of that information?

Teachers

Teachers identified the media-and specifically television-as being the primary source of information about the agri-food system. They thought that television, however, sends mixed messages about food. On one hand, the nightly news reports food scares and negative stories about food, but at the same time advertisers capture youths' attention and shape their attitudes about what is good to eat. As a result, teachers see a disproportionate amount of media exposure to "junk" and snack foods. Several of the groups mentioned the success of the pork, beef and milk

campaigns in creating positive images for their products. In fact, one evening's conversation expressed hope that fruit and vegetable producers would one day hire child actors and actresses to similarly promote their products and thus capture their students' attention for eating healthy foods. Some teachers, cautioned, however, that it makes little sense to identify a food as "heart-healthy" since that type of message will go right over a normal child's head.

Teachers indicated that families are another source of information about food, but not a very knowledgeable one. It is well-known that children follow what is modeled at home. For agri-food system education this may be troubling. Not only do few of today's parents have any ties to farms, but because they are often the first generation to be totally raised on television, they, too, rely on this medium for most of their information about the food system and food choices. From their own personal experiences, educators acknowledged that convenience takes precedence over nutrition in many families.

Teachers obviously believe that the schools play an important role in food system education, and, as one teacher noted, "Children won't get information about how a cracker is made and gets to their table unless it comes from schools." These educators mentioned that they use the Michigan Health model for much of their teaching about food. Nutrition and label reading, for example, are two topics that regularly came up in all three focus groups and they are included subjects in the Michigan Health Model.

Teachers raised the concern that even the school system sends mixed messages to students. While classrooms may emphasize nutrition and a concern for the environment, school cafeterias and buildings may serve and sell "junk" food in non-biodegradable packaging. By having ala carte menus, schools may unintentionally permit students to eat only what they like, thereby precluding a balanced meal. Cafeterias, in particular, are constantly fighting a losing battle to prepare nutritious food that students will eat and not throw away. Some teachers noted that having candy and pop machines in school buildings contradicts a goal of good nutrition.

Comparison

Both groups saw advertising and news stories as dominant sources of food system information. While stakeholders were worried that the media portrayed the food system as unsafe, teachers thought that the media glamorized unhealthy food. Indeed, teachers were acutely aware of the mixed food messages that children receive from mass media, school cafeterias and even at home. As a result, teachers saw a need to teach product label-reading and the food pyramid, which stakeholders also deemed as important information sources.

Both groups did see the media's potential for good, as each had favorable impressions of commodity promotion's for pork, beef and milk. In addition, each group also recognized the important roles that parents play in shaping children's attitudes toward food. Both were concerned with parents' ability to model "healthy" food choices for their children because of their own limited understanding of food, agriculture and nutrition.

Objective 4: Agri- food system topics and subject matter

Stakeholders

Stakeholders stressed that food must be taught in a systems context. Students need to understand food's interconnectedness to the environment, society, economy and to their health. Participants recommend exposure to the agri-food system's relationships to soil, land use, waste production and culture.

Similarly, stakeholders thought that schools must emphasize the role of food in nutrition. Students should learn the food pyramid and should understand how food affects the body, its part in human growth and development and its role in preventive health. Food preparation instruction was also seen as necessary to help reinforce this knowledge and to provide students with basic life skills.

School lunchrooms are also seen as a potential site of learning about the agri-food system. Stakeholders suggested placing nutrition and health education posters on the walls to reinforce healthy eating habits. At the secondary school level, school-to-work programs could place students in agri-food system-type jobs. Stakeholders noted that for the

education system to be an effective source of information, teachers would need training and curricula to meet the Michigan Core Curriculum Standards and Benchmarks.

Teachers

Teachers described how direct instruction about the agri-food system now begins early in elementary curricula, but tapers off in middle school and instead health and nutrition topics are emphasized, probably due to the Michigan Health model curriculum. They stated that in early elementary, teachers used farm animals to teach about concepts such as: the relationship between parent and young or humans' reliance upon animals. They pointed out, however, that after this initial exposure to farm animals, little in the way of formalized instruction was presented in a coordinated fashion. Teachers believed that the majority of knowledge and understanding after the early elementary years came from sources outside of school, e.g. media, peers, family and personal experience. Related to this was the teachers' concern with teaching about issues that they believed to be "too sensitive." For example, they discussed their concern that some younger children didn't associate farm animals with meat; but, they also felt it a topic too sensitive to broach in their classes. There were two contrasting perspectives on this issue, as teachers from rural areas were less fearful to broach this topic than their urban counterparts. On several occasions, rural teachers were able to incorporate meat coming from animals into lessons as a result of their students' personal experiences with hunting.

Upper elementary teachers explained that topics related to the food system do occasionally surface in science and social studies. Specifically, they suggested that topics of current interest were discussed as they took the spotlight. For example, they discussed weather and geography as it related to El Nino, water quality, and deforestation. In addition, teachers said that agriculture was touched upon as students explored past cultures and current economic systems in their social studies classes. In science, teachers stated that newly developed science curriculum from the Michigan Department of Education provided potential assistance in teaching about the connections between people and plants, but that few actually used these products. They also stressed that much of what they taught in science was directly related to the Michigan Educational Assessment Program (MEAP), which is the state's standardized science testing conducted in fifth and eighth grade.

Teachers stated that they teach about issues related to agriculture, such as wetland preservation, deforestation, geographic regions, packaging, weather, etc., but seem to often present the topics in a manner devoid of this agricultural content. Those teachers stating that they make these connections, appeared, by their discourse, to be more comfortable with the interconnectedness of these concepts, while those with little background spoke only of touching upon these topics as a result of their textbooks.

Younger/newer teachers stressed they were very selective about what they taught their students; they felt great pressure to teach the content that was expected by their administration. Several believed that teaching about the food system would take time away from what was required to be taught.

Comparison

Teachers indicate nutrition education dominates agri-food system education in most elementary and middle school classes. Early elementary teachers touch upon farms and farm animals in their formalized curriculum, while in upper elementary and middle school agri-food system topics are primarily addressed through class discussions of current events, i.e. food scares. In contrast, roundtable participants urged a broader, more holistic perspective. They believe students should learn how the agri-food system interconnects with the environment, the economy, society, and personal health and should be woven into curricula at all grade levels.

Both teachers and roundtable participants identified a need for thematic curriculum products that integrate food system themes into social studies, science, mathematics, English and health. They each agreed of the impracticality of developing a stand-alone curriculum. Agri-food stakeholders proposed the development of supplementary educational products which address systems education and foster critical thinking skills. Teachers stressed such products should be aligned with the Michigan Model Curriculum Standards and Benchmarks, of which agri-food roundtable participants had little knowledge.

Conclusions

1. Teachers and stakeholders differ in their perceptions of the agri-food system. Teachers lack a complete understanding of the system's interconnections, while stakeholders fail to fully appreciate consumers' concern for food safety.

2. Both groups believed agri-food system education important for making informed decisions. They differed, however, in their reasoning for the need to teach about the system . This incongruity may pose problems in the adoption of agri-food system curricula that meets stakeholder concerns, but not those perceived by teachers.

3. Despite both teacher and stakeholder beliefs that agri-food system education can be integrated throughout the curricula. Currently, little material is taught above the early elementary level in an organized fashion.

4. Sources outside of the school system play a dominant role in the public's understanding of the agri-food system. Both stakeholders and teachers believe the school system to be an ideal setting to provide a balanced perspective on the agri-food system.

Recommendations

1. Because teachers have a limited understanding of the inter-connectedness of the agri-food system, professional development is warranted. The focus of this intervention would help teachers understand the agri-food system beyond food consumption and nutrition.

2. Developers of agri-food system curricula need to be cognizant of teachers' familiarity with health and nutrition topics when designing educational products. By linking educational products and curricula to teachers' comfort with health and nutrition, the probability of teacher adoption may be increased.

3. Teachers are willing to incorporate agri-food system material throughout the curricula, but need assistance in making curricular connections between subjects and to agri-food topics.

4. Conduct additional research, possibly employing the Delphi or survey techniques, to shed further light on this embryonic study

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A Critique By:
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Charting a Course for Education in Michigan: Comparing Elementary and Middle School Teachers' Perceptions Of and Ideas About the Agri-food System with System Stakeholders

Although this paper exceeded the maximum acceptable length by three pages, I certainly was not annoyed by the additional reading. I believe that the topic is important to our profession, and I found the approach to studying the issue refreshing. The results of the roundtable discussions and focus groups were presented in detail and gave a deeper understanding of perceptions than is possible in a quantitative study. For the most part, conclusions and recommendations were supported by the results and were reasonable.

I really appreciated the efforts made to select a representative group of stakeholders and teachers, but would encourage the author(s) to be make it more clear that as it turned out there is no basis for concluding that the results are generalizeable - not even to the original sample. The author(s) indicated that the stakeholders were purposively selected but did not indicate for what purpose. In other words, what criteria were used to select members of the stakeholder group? In addition, what were the characteristics of the groups that participated in the study? I was surprised to find no demographic profile.

The four questions that were asked used the words "food-system" - not "agri-food system." The author(s) noted on one occasion that "the teachers' responses dealt primarily with food education and not with agri-food system education." In another instance the author(s) wrote that " teachers primarily see the food system in terms of food safety and nutrition education. They are not as familiar with the production and processing aspects of the food system . . . . " Didn't they simply answer the question that was presented to them? Is your analysis of their response biased? Personally, I may have said some of the same things teachers said if I had been part of their focus group. But if I had been in a group of persons representing the agriculture industry, my remarks would likely parallel those made by the stakeholders. Could it be that the teachers know more than you give them credit for? Relatedly, the author(s) note in the conclusions section that "because teachers have a limited understanding of the interconnectedness of the agri-food system, professional development is warranted?" Obviously, I am skeptical of whether participants in the focus group actually need professional development related to this issue. More importantly, this study does not provide sufficient evidence to recommend professional development for a larger group of teachers.

Overall, I found this to be a very good paper. I believe that the researcher(s) surfaced some very important issues, and I would encourage that they follow up on recommendation number four to determine perceptions of the issues on a broader more representative scale.

Comparison of Elementary Teachers' Use of Agriculture in Their Teaching

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Introduction

A wealth of research has found a lack of understanding and a low perception of agriculture by both students and teachers (Horn & Vining, 1986; National Research Council, 1988; Williams & White, 1991; Terry, Herring, & Larke, 1992; Cox, 1994; Wright, Stewart, & Birkenholz, 1994).

In an effort to evaluate the status of agricultural education, the National Research Council (1988) established the Committee on Agricultural Education in Secondary Schools to conduct a study to address the status of agricultural education. Findings from that report indicated that education about agriculture should take place in all grades, K-12. The report also stated that little effort was being made to provide opportunities for teacher education about agriculture and that teachers were generally unaware of the instructional materials designed to address education about agriculture. The Committee suggested that "in-service education or special summer programs for teachers should be offered focusing on how to use new instructional materials" (p. 17).

Agriculture education at the elementary level is not a new concept (Everett, 1985). Everett cited that in 1914 the role of agricultural education at the elementary level was the awareness and orientation of agriculture. Ferguson and Lewis (1908) identified knowledge of the science of agriculture was desirable. They advocated that "every American should understand the elementary principles of agriculture because it is our country's most important industry" (p. 1). These authors further stated that "school is a place where many of our ideas and ideals are formed" (p. 264). One model program identified by the NRC (1988) as a means to provide education about agriculture at the elementary level was Agriculture in the Classroom (AITC). The USDA began the AITC program in 1981 (Traxler, 1990). AITC programs are present in every state (Moore, 1993).The NRC (1988) reported that the USDA had estimated that teachers using AITC materials have reached approximately 1.2 million elementary students.

Agriculture remains an important industry in our country. In 1985, Mawby noted that "few issues are of greater importance to the world than adequate food supplies, proper food use, and knowledge about the components of the agricultural industry" (p. 7). The Committee stated (NRC, 1988) "Agriculture - broadly defined - 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). All people are affected by the agriculture industry, socially,

economically, and environmentally (Pope, 1990). Law and Pepple (1990) suggested all members of society have a vested interest in agriculture.

Hillison (1992) commented that a key to educating students about agriculture, especially at the elementary grade levels, was through elementary teachers. Yet, these teachers needed assistance in doing so. Birkenholz, Frick, Gardner, and Machtmes (1995) recommended pre-service and in-service opportunities as the vehicle to facilitate the use of agricultural topics and examples in the classroom. This agreed with studies by Terry, Herring, Larke (1992), Cox (1994), and Connors and Elliot (1994) which found that teachers needed assistance through in-service opportunities and material and information.

Several states such as California, Idaho, Montana, Michigan, New Mexico, Oregon, and Oklahoma have provided teacher workshops to familiarize teachers with the use of agriculture to teach core areas (Emery & Linder, 1993, Pals & Waitley, 1996, Lombardi & Malone, 1990, Moore, 1993, Dormody & Shanks, 1992, Balschweid, Thompson, & Cole, 1998, Wilhelm, Cox, & Terry, 1998). In these states, the workshops received positive acclaim by the teachers who attended.

In Oklahoma, AITC instructional materials and teacher institutes are available. Yet, little is known about the effectiveness of efforts to facilitate the teaching about agriculture in Oklahoma. Because of this lack of information, there is a need to examine the effectiveness of Oklahoma AITC program teacher development efforts that are designed to increase the use of agriculture by teachers as a vehicle to teach core areas. The question that needed to be answered was, "What is the value of the Oklahoma AITC summer institute as a means to introduce and increase Oklahoma elementary school teachers' use of agriculture in their teaching?"

Purpose and Objectives

The purpose of this study was to determine whether the AITC summer institutes have influenced teachers' use of topics related to agriculture in their teaching. To accomplish the purpose of this study, the following objectives were formulated.

1. Describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.
2. Describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.
3. Describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.
4. Describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

Procedures

The population for this study was elementary teachers on the Oklahoma AITC newsletter mailing list. Teachers were placed on the newsletter based on attendance to past summer institutes, a mini-

workshop by the Oklahoma State Department of Education, or a one-day workshop led by 4-H personnel/Extension educator. Teachers were also placed on the mailing list if they had signed up at a trade show or Oklahoma Education Association annual conference booth, found the materials in their school, or purchased instructional materials through The Corner Post newsletter.

Two groups were utilized in this study. One group consisted of the 92 Oklahoma elementary teachers who had attended one of the first three summer institutes offered at Oklahoma State University. These teachers taught in grades ranging from kindergarten to sixth. The second group consisted of a random sample of teachers from the current newsletter mailing list who had not attended a summer institute. The target group was those teachers on the mailing list who taught grades kindergarten through sixth. The current mailing list consisted of 826 Oklahoma teachers. Teachers who had attended a summer institute were removed from the mailing list leaving a list of 734 eligible teachers. From this list, a sample of 250 teachers, per the recommendation of Krejcie and Morgan (1970), was selected. Random sampling procedures were used.

A mailed questionnaire was used to collect data for this comparison study. The questionnaire was designed by the researcher from research instruments used in similar studies (Terry, Herring, & Larke, 1992, Cox, 1994). The questionnaire consisted of four parts which included demographic information, use of topics and resources related to agriculture, number of lessons using a topic related to agriculture in core area subjects, and teacher development experiences.

To establish content and face validity, faculty and staff of the department of Agricultural Education, Communication, and 4-H Youth Development at Oklahoma State University reviewed the instrument. These reviewers examined the instrument based on appropriateness to measure the objectives. Additionally, a pilot study was used. Seven Oklahoma elementary educators not included in the sample piloted by the questionnaire. Based on the recommendations of the teachers in the pilot study and those of the faculty and staff at Oklahoma State University, some questions were re-written and/or re-designed for clarity.

Reliability was established from portions of questionnaires used on past similar studies. Part II of the questionnaire, used in the study by Terry, Herring, and Larke (1992), had a Cronbach's alpha reliability of .89. Part III of the questionnaire had a Cronbach's alpha reliability of .73 that was calculated from this study.

A total of three mailing attempts of the questionnaire were made to ensure adequate response. Two weeks after the original mailing, a follow-up post card was mailed to those teachers who had not yet responded. A third reminder was mailed two weeks following the post card reminders. To address non-response, early respondents were compared to late respondents to determine any differences between respondents and non-respondents. As no significant differences were found, the sample included both early and late respondents. For this study, the findings are cautiously inferred to the larger population.

Analysis of Data

Descriptive statistics were used to evaluate demographic information and group means and frequencies. Chi-square procedure was used to analyze questions that required a categorical response of yes or no in order to look at differences between the two population groups. On questions that asked for a number response, analysis of variance (ANOVA) was used to compare differences between the two population groups. An alpha level of .05 was used in all statistical analysis.

Results

Respondents were divided into two groups based on their Agriculture in the Classroom training experience. Those groups were 1) the 92 Oklahoma elementary teachers who had attended one of the first three AITC summer institutes offered at Oklahoma State University and 2) a random sample of 250 teachers from the current AITC newsletter mailing list who had not attended a summer institute. Throughout the remainder of this study, teachers in the first group were referred to as "institute teachers" and the teachers in the second group were referred to as "non-institute teachers".

Of the 92 institute teachers, 55 questionnaires were returned. From the 55 respondents, three were deemed not useable as those three teachers were no longer teaching an elementary classroom. The response rate of institute teachers was nearly 60%. Of the 250 questionnaires mailed to the random sample of non-institute teachers, 138 questionnaires were returned. Of the 138 questionnaires, 45 were deemed not useable because those respondents were no longer teaching in an elementary classroom. The response rate of non-institute teachers was 55.20%.

Findings Related to Objective One:

Institute teacher respondents were all female and had a mean age of nearly 44 years. They had nearly 15 years teaching experience and most reported their highest degree to be a bachelors degree (64.71%). Grade levels taught ranged from pre-kindergarten to sixth grade. Eighty percent of institute teachers taught in rural communities and small towns. Very few of the respondents, fewer than 4%, had been a member of FFA. Over half, 51.00%, had been a member of 4-H with a mean length of membership of slightly more than 2 years. Few of the respondents had ever taken an agriculture course in either high school and/or college. Of the respondents, 60.00% grew up on farms or ranches or in small towns. Nearly half of the respondents indicated agricultural production or an agricultural business had been the major source of income for them and/or their family. Twenty-one of the respondents (41.18%) also indicated involvement in organizations such as 4-H leader and/or parent, FFA booster organizations, Farm Bureau, and/or farmer's cooperatives.

Non-institute respondents were predominantly female (95.65%) with a mean age of nearly 43 years. They had nearly 16 years teaching experience and had reported a bachelors degree (59.78%) as their highest degree. Grade levels taught ranged from pre-kindergarten to sixth grade. Nearly

40% of non-institute teachers taught in rural communities, followed by small towns (23.91%). Nearly ten percent of the respondents had been a member of FFA. Less than half of the respondents had been a member of 4-H with a mean of just more than 2 years of membership. A limited number of the respondents (18.48%) had ever taken an agriculture course in either high school and/or college. The respondents indicated a variety of types of communities in which they grew up. Nearly 27% of the respondents grew up on farms or ranches, followed by large towns (21.35%) and small towns (19.10%). Nearly 40% of the respondents indicated that agricultural production or an agricultural business had been the major source of income for them and/or their family. Nineteen of the respondents (20.65%) also indicated involvement in organizations such as 4-H leader and/or parent, 4-H Foundation, FFA booster organizations, FFA Alumni, Young Farmers, Farm Bureau, and/or farmer's cooperatives.

In comparing the demographic characteristics of institute and non-institute teachers, significant differences were found in teachers teaching in a small town community, and affiliation with agricultural organizations. More institute teachers taught in small towns and were involved in agricultural organizations than were the non-institute teachers. These data are shown in Table 1 and Table 2.

Table 1: Age, gender, and teaching experience of institute and non-institute teachers

Characteristic	Institute teachers			Non-institute teachers			P(t)
	N	M	%	N	M	%	
Years of teaching experience	51	14.76		92	15.60		.5921
Age	51	43.80		87	42.98		.6204
Gender							.1310
Female	51		100.00	88	95.65		
Male	0		0.00	4	4.35		

Table 2: Other demographic characteristics of institute and non-institute teachers

Characteristic	Institute teachers		Non-institute teachers		χ^2 p-value
	N	%	N	%	
Member of FFA	2	3.92	9	9.78	.2077
Member of 4-H	26	51.00	43	46.74	.6268
Took agriculture course(s) in high school	3	5.88	11	11.96	.2417
Took agriculture course(s) in college	3	5.88	6	6.52	.8801

Table 2: Continued

Characteristic	Institute teachers		Non-institute teachers		χ^2 p-value
	N	%	N	%	
Community in which school is located:					
Rural (<2000)	20	40.00	34	36.96	.8874
Small town (2001 to 15000)	20	40.00	22	23.91	.0448*
Large town (15001 to 45000)	3	6.00	13	14.13	.0924
City (45001 to 75000)	3	6.00	10	10.87	.3365
Large city (>75000)	4	8.00	13	14.13	.2825
Community in which respondent grew up:					
On a farm/ranch	18	36.00	24	26.97	.2469
Rural (<2000)	9	18.00	17	17.10	.6367
Small town (2001 to 15000)	12	24.00	19	21.35	.7185
Large town (15001 to 45000)	4	8.00	14	15.73	.1927
City (45001 to 75000)	3	6.00	9	10.11	.4074
Large city (>75000)	4	8.00	6	6.74	.7829
Level of education					.5621
Bachelors	33	64.71	55	59.78	
Masters	18	35.29	37	40.22	
Doctorate	0	0.00	0	0.00	
Agriculture production/business is a major source of income for respondent and/or family	25	49.02	36	39.14	.2521
Involvement in agricultural organizations	21	41.18	19	20.65	.0088*

*significant at α=.05

Non-institute teachers were asked to indicate topics related to agriculture taught in their classrooms from the same list of topics as institute teachers. More than half of the non-institute teachers indicated they taught 9 of the 14 topics listed. The five most commonly taught topics were nutrition and proper food selection (83.87%), sources of food (80.65%), plant growth and development (78.50%), wildlife (75.27%), and insects (73.12). Some respondents listed additional topics in the "other" area. These topics were animal growth and development and hatching chicken eggs (see Table 4).

Two of the 14 topics were found to have statistical differences between institute teachers and non-institute teachers. Those topics were farm animals and gardening - floral and/or vegetable. In both cases, institute teachers used each topic significantly more than did the non-institute teachers. Table 5 summarizes the comparison of use of topics related to agriculture.

Table 3: Agricultural topics taught by institute teachers

Topic	N	Percent
Farm Animals	47	92.16
Plant growth and development	46	90.20
Nutrition and proper food selection	45	88.24
Insects	44	86.27
Sources of food	43	84.31
Wildlife	43	84.31
Gardening (floral and/or vegetable)	42	82.35
Ecology and environmental management	39	76.47
Role of agriculture in our economy	33	64.71
Agriculture in our history	30	58.82
Small animal and pet care	29	56.86
Sources of fiber (for clothing, building, etc.)	28	54.90
Agricultural careers	28	54.90
Composition of soils	18	35.29

Table 4: Agricultural topics taught by non-institute teachers

Topic	N	Percent
Nutrition and proper food selection	78	83.87
Sources of food	75	80.65
Plant growth and development	73	78.50
Wildlife	70	75.27
Insects	68	73.12
Farm Animals	61	65.59
Ecology and environmental management	60	64.52
Gardening (floral and/or vegetable)	53	56.99
Role of agriculture in our economy	52	55.91
Agriculture in our history	46	49.46
Sources of fiber (for clothing, building, etc.)	45	48.39
Small animal and pet care	41	44.09
Agricultural careers	39	41.94
Composition of soils	20	21.51

Table 5: Comparison of use of topics related to agriculture between institute and non-institute teachers

Topic	df	χ^2	χ^2 p-value
Farm Animals	1	12.397	.0004*
Gardening (floral and/or vegetable)	1	9.439	.0021*
Insects	1	3.298	.0693
Composition of soils	1	3.224	.0726
Plant growth and development	1	3.143	.0762
Agricultural careers	1	2.226	.1357
Ecology and environmental management	1	2.191	.1388
Small animal and pet care	1	2.152	.1423
Wildlife	1	1.595	.2066
Agriculture in our history	1	1.158	.2819
Role of agriculture in our economy	1	1.053	.3049
Sources of fiber (for clothing, building, etc.)	1	.5590	.4545
Nutrition and proper food selection	1	.5040	.4779
Sources of food	1	.3000	.5841

*Significant at α=.05

Findings Related to Objective Three:

Institute teachers were asked to indicate sources of teaching materials related to agriculture used in the classroom from a list of 20 sources. Of the 20 sources, 7 sources were used by over half of the respondents (see Table 7). AITC materials were used by 100% of the institute teachers. Other commonly used sources of teaching materials related to agriculture were chapters in text books (66.67%), the Cooperative Extension Service (64.71%), dairy associations or groups (62.75%), United State Department of Agriculture (62.75%), articles about agriculture in newspapers and/or magazines (60.78%), and Project Wild (60.78%).

Table 7: Resources related to agriculture used by institute teachers

Source	N	Percent
Agriculture in the Classroom	51	100.00
Chapters related to agriculture in text books	34	66.67
Cooperative Extension Service	33	64.71
Dairy associations or groups	32	62.75
United States Department of Agriculture	32	62.75
Articles about agriculture in newspaper and/or magazines	31	60.78
Project Wild	31	60.78
4-H school enrichment programs	25	49.02
Environmental associations or groups	22	43.14
Animal associations or groups	20	39.22
Project Learning Tree	19	37.25
Flower and plant associations or groups	16	31.37
Meat associations or groups	12	23.53
Materials from local high school agriculture program	8	15.69
Seed and grain associations or groups	8	15.69
National FFA Organization	7	13.73
Farm Bureau	5	9.80
Food for America	5	9.80
Vegetable associations or groups	5	9.80
Fruit associations or groups	3	5.88

Non-institute teachers were asked to indicate sources of teaching materials related to agriculture used in their teaching from the same list of 20 sources. Of the 20 listed, 5 were used by more than half of the respondents (see Table 8). AITC materials were used by slightly more than 80% of the non-institute teachers. Other common sources of teaching materials related to agriculture were chapters in text books (64.52%), Project Wild (62.37%), articles about agriculture in newspaper and/or magazines (50.54%), and the Cooperative Extension Service (50.54%).

Table 8: Resources related to agriculture used by non-institute teachers

Source	N	Percent
Agriculture in the Classroom	77	82.80
Chapters related to agriculture in text books	60	64.52
Project Wild	58	62.37
Articles about agriculture in newspaper and/or magazines	47	50.54
Cooperative Extension Service	47	50.54

Table 8: Continued

Source	N	Percent
Dairy associations or groups	43	46.24
Environmental associations or groups	39	41.94
United States Department of Agriculture	39	41.94
Animal associations or groups	32	34.41
4-H school enrichment programs	25	26.88
Flower and plant associations or groups	24	25.81
Project Learning Tree	23	24.73
Materials from local high school agriculture program	18	19.36
Meat associations or groups	13	13.98
Seed and grain associations or groups	13	13.98
Fruit associations or groups	10	10.75
Food for America	9	9.78
Farm Bureau	8	8.60
Vegetable associations or groups	8	8.60
National FFA Organization	7	7.53

In comparing the two groups of teachers, significant differences were found in use of 4-H school enrichment programs, AITC materials, and USDA materials. Institute teachers used these three sources significantly more than did the non-institute teachers. A report of these findings from all sources is in Table 9.

Table 9: Comparison of use of resources related to agriculture between institute and non-institute teachers

Source	df	χ^2	χ^2 p-value
Agriculture in the Classroom	1	9.871	.0017*
4-H school enrichment programs	1	7.122	.0076*
United States Department of Agriculture	1	5.437	.0197*
Dairy associations or groups	1	3.597	.0579
Cooperative Extension Service	1	2.678	.1018
Project Learning Tree	1	2.501	.1138
Meat associations or groups	1	2.094	.1479
National FFA Organization	1	1.442	.2298
Articles about agriculture in newspaper and/or magazines	1	1.393	.2379
Fruit associations or groups	1	.9510	.3294
Flower and plant associations or groups	1	.5090	.4757
Animal associations or groups	1	.3300	.5657
Materials from local high school agriculture program	1	.3000	.5841
Seed and grain associations or groups	1	.0770	.7812
Chapters related to agriculture in text books	1	.0670	.7954
Vegetable associations or groups	1	.0580	.8098
Farm Bureau	1	.0580	.8098
Project Wild	1	.0350	.8518
Environmental associations or groups	1	.0190	.8890
Food for America	1	.0010	.9967

*Significant at α=.05

Findings Related to Objective Four:

Core area subjects were outlined in the Oklahoma Priority Academic Student Skills (PASS) manual prepared by the Oklahoma Department of Education (revised 1997). Institute teachers indicated that science was the core area in which the most topics and/or examples related to agriculture were used followed by math, language arts, social studies, information skills, and visual arts, respectively. Non-institute teachers reported that the most lessons they taught using a topic and/or example related to agriculture was in the core area of language arts followed by social studies, information skills, math, visual arts, and science, respectively.

Analysis of variance showed significant differences in two of the six core areas. Those two core areas were language arts (p=.0350) and information skills (p=.0407). In both cases, institute teachers taught more lessons using an agricultural topic and/or examples in those core areas. Table 10 summarizes these data.

Table 10: Number of lessons using an agricultural topic and/or example in core area subjects by institute and non-institute teachers

	Institute Teachers	Non- Institute Teachers	ANOVA p-value
Core Area	Mean # of lessons	Mean # of lessons	
Science	81.85	63.94	.3479
Math	76.42	70.35	.8487
Language Arts	64.98	24.33	.0350*
Social Studies	36.21	26.16	.3018
Information Skills	24.40	8.57	.0407*
Visual Arts	22.56	10.39	.1673

*significant at α=.05

Conclusions and/or Recommendations

Conclusions

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

1. Demographic characteristics of institute and non-institute teachers were quite similar.
2. Teachers who attended the summer institute tend to have a vested interest in agriculture. Nationally, 20% of people are involved in the agriculture industry (Glickman, 1996). Based on the findings of this study, nearly 40% of non-institute teachers and nearly 50% of institute teachers indicated that agriculture was a major source of income.
3. Teachers who have attended an Oklahoma AITC summer institute teach more topics related to agriculture than do their counterparts who have not attended an AITC summer institute.
4. Teachers who have attended an Oklahoma AITC summer institute use a greater variety of resources to teach about agriculture than do their counterparts who have not attended an AITC summer institute.
5. Based on teachers' responses, AITC materials are popular resources used by both institute and non-institute teachers although used significantly more by institute teachers.

A Critique By:
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Perceptions of Students and Faculty Regarding the Academic Rigor of On- and Off-Campus Agriculture Courses

The delivery of college-level courses via means other than the traditional campus setting has been in the forefront of the literature now for several years. This paper by Miller and Pilcher at Iowa State makes an important contribution to colleges of agriculture and the faculty who are responsible for making academic decisions.

The paper is very well written. In fact, except for failing to identify the university where the study was conducted, the introduction, purpose and objectives, and procedures are nearly flawless. Adequate background information, given the space constraints, leads to a clear understanding of the problem, namely the potential perception that off-campus courses lack academic rigor. Procedures were appropriate to the stated objectives, and the researchers are to be complimented on their use of appropriate non-response follow up.

The emphasis of this critique centers on the usefulness of the results, not only to the university studied but by others who may want to draw upon this new-found knowledge or replicate the study in a local setting. What is an "off-campus" course? That term is not defined in this study. Since the writer of this critique is privy to two other papers that report studies of "off-campus" and "distance education" courses, there is some suspicion that "off-campus" courses may be a mixture of delivery modes other than the traditional campus classroom, making the results somewhat less useful in other settings. Perhaps all of us should take more care in being clear when we use terms like off-campus and distance delivery.

The body of data presented in Table 1 is the essence of the study. The table headings could be more complete, so that the reader is reminded that off-campus students were rating the rigor of courses taught on-campus and off-campus, with comparable ratings by faculty who, presumably, may not have ever taught a course off-campus. Therein lies an important message and question for us to ponder. Off-campus students think off-campus courses are as rigorous as on-campus courses. Perhaps they have never experienced an on-campus course. Perhaps they are extremely biased toward off-campus courses, with a desire to assure themselves that the education they are receiving is just as good as the on-campus students receive. Few of us would ever admit that our experience, especially if it was our only opportunity, was inferior to the experience of others.

And finally, in the same vein, we might expect campus-based faculty to question the rigor of a course that was taught in a manner different from the norm. It has been my observation that most of us have practiced, to some degree, a little institutional snobbery from time to time. We should not be surprised, then, that the perceptions of faculty regarding the rigor of courses would be somewhat lower for off-campus than for on-campus courses. The reported differences in mean scores across populations and course delivery may be inconsequential. Now let's move forward in making rigorous college-level courses available to a broader array of students utilizing a wider selection of delivery modes.

Off-Campus Students and Agriculture Teaching Faculty Perceptions of the Quality of On- and Off-Campus Courses

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Introduction

Increasing competition, costs, and accountability are driving forces behind an intensifying emphasis on quality in education (Seymour, 1993). This focus on quality is also intensifying in the distance education realm. In fact, Olcott (1991) emphasized that the quality of off-campus courses is a universal concern among the stakeholders in education. Although quality in education has been identified as a primary concern, it has not been well defined. The traditional indicators of quality that academic institutions identify include: entrance standards, famous graduates, reputation rankings, and/or the presence of distinguished faculty (Seymour, 1993; Verduin & Thomas, 1991). However, these indicators measure the quality of academic institutions, not the quality of the educational experience at the course level.

Quality of education is a relative abstraction that reflects individual values, perceptions, and experiences between the student and the professor (Schwartz & Peterson, 1993; Seymour, 1993). Recognizing its relative nature, Garvin (1984) provided a measurable framework for defining quality. He identified five indicators of quality including: manufacturing-based, user-based, value-based, transcendent, and product-based. Manufacturing-based definitions emphasize the supply side and are mainly concerned with "conforming to requirements" (p. 28). These requirements are often the result of consumer preferences. User-based definitions focus on consumer preferences. In the user-based approach, products that satisfy consumer requirements are of highest quality. The value-based approach describes quality as performance at an acceptable cost. Transcendent quality is "innate excellence" (p. 25). In the transcendent approach, quality is difficult to define because it is recognized only through experience. Product-based definitions identify quality as an inherent and measurable attribute.

Garvin's (1984) framework has been applied to studies (Gilbert, Keck, & Simpson, 1993; Schwartz & Peterson,1993; Seymour ,1993) of quality in education. More recently, Miller and Shih (1998) used Garvin's framework to describe faculty members' perceptions of the quality of on- and off-campus agriculture courses. Miller et al. focused on faculty perceptions because Dillon and Walsh (1992) cited faculty resistance as a major obstacle to the success of distance education programs. Results of their study indicate that faculty perceived off-campus courses to be of lower quality than on-campus courses. Although Miller et al. examined faculty perceptions, it is important to also consider the perceptions of students. According to Schwartz and Peterson (1993), a focus on quality from the students' perspective is imperative for understanding the educational process.

Total quality management (TQM) in education advocates a focus on students' perspectives. In TQM, the customers' needs are paramount; the customers are the students. In fact, Sallis (1993) claims "the customers are the final arbitrators of quality and without them the institution does not exist" (p. 24). According to this TQM perspective, quality occurs when the students' needs are addressed. Students' needs are becoming the focus of quality as TQM increasingly is being implemented in education (Sallis, 1993). Who should determine quality? If quality reflects the individual values, perceptions, and experiences between the student and professor, then understanding the

perceptions of both faculty members and students may provide insight into the quality of specific educational experiences.

Purpose and Objectives

The purpose of this study was to describe and compare perceptions of the quality of on-campus and off-campus courses held by off-campus students and college of agriculture teaching faculty. The objectives of the study were as follows:

1. Compare off-campus agriculture students' perceptions of the quality of on- and off-campus courses.
2. Compare and contrast off-campus agriculture students' perceptions of the quality of on- and off-campus courses with those of college of agriculture teaching faculty members.
3. Compare and contrast off-campus agriculture students' perceptions of selected off-campus student and course characteristics with those of college of agriculture teaching faculty.

Procedures

The populations for this study included students enrolled in courses offered through an off-campus professional agriculture degree program in a land-grant university college of agriculture during spring and fall semesters of 1997 and faculty members with teaching responsibilities or with teaching experience in the same college of agriculture during spring semester 1997. The coordinator of the Off-Campus Professional Agriculture Degree Program provided the list of students. Individual class lists were used to confirm that each student had truly taken their course(s) off-campus. The Dean's office provided the list of teaching faculty members, and departmental secretaries checked the list for accuracy. The target populations were composed of 173 students and 262 faculty members. A census of both populations was conducted.

The questionnaire, designed by Miller et al. (1998), included two Likert-type scales, 11 closed-ended questions, and 1 open-ended question. Four of Garvin's (1984) approaches (manufacturing-based, user-based, value-based, and transcendent) to defining quality provided the framework for developing the course quality statements included on the Likert-type scales. The scales had response options ranging from (1) strongly disagree to (5) strongly agree. In addition, students and teaching faculty were asked to compare on-campus courses with those delivered through distance education technologies on five characteristics and to compare on-campus and off-campus students on six characteristics. A closed-ended question format was used for these comparisons. Students and faculty were also asked the following open-ended question. In your opinion, what are the most significant differences between on-campus and off-campus courses?

Miller et al. (1998) established content and face validity for the questionnaire. They reported Cronbach's alpha reliability coefficients of .90 and .84 for the on-campus and off-campus course quality scales, respectively. They also performed test-retest reliability analyses for the 11 closed-ended questions. The percentage agreement for the five items used to compare on-campus courses with those delivered by distance education technologies was 75, and the percentage agreement for the six items used to compare on-campus and off-campus students was 95. Miller et al. developed the questionnaire and established validity and reliability specifically for the teaching faculty population described in this study. The researchers concluded that the questionnaire was also suitable for use with the off-campus student population.

Data were collected from off-campus students in November 1997 and from faculty in February 1997. The questionnaire and a cover letter describing the purpose of the study were sent by U.S. mail to off-campus students and by campus mail to teaching faculty. Two complete follow-ups of nonrespondents were conducted. A postcard was sent to nonrespondents 10 days after the initial mailing encouraging them to respond, and a second mailing that included the questionnaire and a new cover letter was sent after 11 more days had past. Fifteen days after the last

mailing to students and ten days after the last mailing to faculty, all subjects who had not completed and returned the questionnaire were considered nonrespondents.

Nonresponse error was controlled by randomly sampling 10% of the nonrespondents from each population and gathering data from them. Telephone interviews were used to gather data from the sample of nonrespondent off-campus students. Telephone contacts followed by face-to-face interviews were used to gather data from the sample of nonrespondent teaching faculty. The chi-square statistic was used to compare respondent and nonrespondent data for the off-campus student population on six randomly selected items taken from the course quality scales. A t-test was used to determine if respondents and nonrespondents from the teaching faculty population differed significantly in their overall perception of the quality of on-campus and off-campus courses. No significant ($p<.05$) differences were found between respondents and nonrespondents in either the off-campus student or faculty populations. The chi-square statistic was used to determine whether respondents and nonrespondents provided different results on the 11 closed-ended questions. No significant differences were found between the respondents and nonrespondents on the four randomly selected student and course characteristic comparisons for the off-campus student population. Significant differences were found on three of the five course characteristic comparisons for the teaching faculty population. These differences included relevance to students, amount of teacher-student interaction, and amount of student-student interaction. No significant differences were found on the six student characteristic comparisons for the teaching faculty population. Results were deemed generalizable to the respective populations, with one caveat. The reader is cautioned that findings for three of the five course characteristic comparisons may not accurately represent the perceptions of the faculty population. In total, 111 questionnaires were completed and returned by off-campus students for a response rate of 64.2%, and 132 questionnaires were completed and returned by faculty for a response rate of 50.4%.

All data were analyzed using SPSS for Windows personal computer program. Appropriate statistics for description were used including frequencies, percentages, means, and standard deviations. Since data were gathered from the population instead of a sample, inferential statistics were not used for comparisons. Student and faculty responses to the open-ended question were analyzed for common themes related to quality.

Results

Participating off-campus students and teaching faculty members were predominately male (71.6% and 93.6%, respectively). Off-campus students were on average 38 years of age, while faculty members were on average 50 years of age. Student respondents listed their primary occupations as: 28.2% in agribusiness, 24.5% in farming, 9.1% in agricultural education, 3.6% in agricultural extension, 3.6% as full-time students, and 26.4% as other. Most (67.6%) of the students were master's candidates. A majority (60.3%) of faculty members were professors. In terms of off-campus course exposure, students had taken an average of 3.5 courses off-campus during the last 3 years, while faculty members taught an average of 0.6 course sections off-campus in the last 3 years.

Table 1 shows that off-campus students provided a slightly higher mean on the course quality scale for on-campus courses. Students perceived the greatest quality advantage for on-campus courses to be on the transcendent factor. In other words, when compared to off-campus courses, students agreed more strongly that on-campus courses project a positive image of the institution, have a reputation of quality, and are acceptable to the public. On-campus courses were rated higher than off-campus courses on the manufacturing-based factor and on 8 of the 12 items for that subscale. Regarding the manufacturing-based quality factor, students agreed that a variety of assessment procedures were used in on-campus courses but were undecided about off-campus courses. In addition, students strongly agreed that students assume responsibility for their learning in off-campus courses but only agreed with the statement when applied to on-campus courses. The item with the greatest mean difference on this subscale concerned instructor availability. Students more strongly agreed that instructors were available to students on campus. Students rated off-campus courses higher on the user-based quality factor and on four of five items from that subscale. Regarding the user-based factor, students agreed that off-campus courses were adjusted to meet student needs but were undecided about on-campus courses. Students perceived on- and off-campus courses to be almost equal on the value-based factor.

They agreed that on-campus courses provided quality instruction at an acceptable cost yet were undecided for off-campus courses.

Overall, faculty provided a slightly higher mean score on the course quality scale for on-campus courses than did students. The magnitude of the differences between student and faculty perceptions was small, however. Faculty provided a higher mean score than students on the value-based quality factor and each of the three items on this subscale. Faculty also provided a higher mean score on the user-based quality factor. Regarding user-based quality, faculty agreed that on-campus courses were adjusted to meet student needs while students were undecided. Students provided a higher mean score than faculty on the transcendent quality factor and each of the items on this subscale. Overall, students and faculty provided the same mean score for the manufacturing-based quality factor. Interestingly, students agreed that departments support courses while faculty were undecided (Table 1).

Students provided a higher overall mean score for the quality of off-campus courses than did faculty. They also provided higher means on 16 of 23 items from the course quality scale. The most notable differences in student and faculty perceptions were on the manufacturing-based factor. Students agreed that instructors were available to students, the learning environment was of high quality, students used instructor support, and departments supported courses, while faculty were undecided about each of these items. Faculty, on the otherhand, agreed that a variety of assessment procedures were used in off-campus courses but students were undecided. Students provided higher mean scores on the user-based and transcendent-based factors for off-campus courses than did faculty. Faculty provided a higher mean on the value-based factor and agreed that students receive quality instruction at an acceptable cost in off-campus courses while students were undecided (Table 1).

Students and faculty responded to five closed-ended statements comparing distance education courses with on-campus courses. Table 2 shows that a majority of faculty and students perceived on- and off-campus courses to be equally relevant to students and they agreed that the amount of teacher-student and student-student interaction was less in off-campus courses. Faculty were more likely than students to indicate that less material was covered in off-campus courses, and were more likely to indicate that off-campus courses were more organized.

Students and faculty responded to six closed-ended statements comparing off-campus students with on-campus students. Table 3 shows that faculty were more likely than students to rate off-campus students lower on academic ability, background in prerequisite courses, the likelihood of completing the course on time, the likelihood of submitting assignments on time, and the likelihood of using library resources. Students and faculty provided similar ratings for on- and off-campus students on the level of relevant work experience.

Students provided a number of comments that shed light on the issue of quality in off-campus courses. They were generally positive in the assessment of off-campus courses, but many comments indicate that there are areas in need of substantial improvement, particularly on the manufacturing-based quality factor. A selection of student comments follows.

- These options are much better than no contact or furthering of one's education.... Many students of off-campus/distance learning would not ever receive a class after B.S. graduation were it not for these off-campus opportunities.
- The classes are very high quality. It is the enrollment process and getting course planning advice that needs help.
- The professor of our class doesn't seem to care too much about the off-campus students. We've taken two exams and it's about time for our third and we still haven't gotten our first one back. It's hard to stay motivated without feedback. I think if professors are willing to consider us as real students then the courses have the potential to be just as useful as on-campus courses.
- Courses taught on videotape are not monitored for quality prior to shipping to students. In a recent lecture the camera slowly moved upward until the ceiling was the only thing that could be seen.
- The biggest drawback I have seen is the inability of instructors to adapt instruction to the distance setting.

Table 1: Means and standard deviations for perceptions of course quality

Factors and abbreviated items	Students				Faculty			
	On-Campus		Off-Campus		On-Campus		Off-Campus	
	Mean[a]	SD	Mean[a]	SD	Mean[a]	SD	Mean[a]	SD
Manufacturing-Based	**3.96**	**.40**	**3.87**	**.56**	**3.96**	**.55**	**3.69**	**.55**
Instructors know the subject matter well	4.36	.57	4.36	.60	4.40	.56	4.33	.64
Instructors are available to help students	4.06	.55	3.54	1.09	4.23	.65	3.19	1.02
Courses represent instructors' best efforts	3.98	.80	3.89	.97	4.12	.78	3.94	.92
Instructors effectively present information	3.98	.64	3.84	.81	4.07	.74	3.93	.81
Current information is presented	4.11	.59	4.19	.72	4.08	.75	4.08	.70
The learning environment is of high quality	4.02	.56	3.65	.89	3.99	.77	3.35	.88
Students assume responsibility for their learning	4.00	.65	4.52	.62	3.97	.83	4.17	.83
A variety of teaching methods is used	3.90	.69	3.81	.92	3.94	.78	3.62	.89
High-quality teaching materials are used	4.03	.61	3.96	.82	3.92	.76	3.89	.77
A variety of assessment procedures is used	3.69	.81	3.47	.93	3.80	.96	3.50	.97
Students use instructor support	3.53	.84	3.58	.89	3.49	.98	3.15	.86
Departments support courses	3.89	.76	3.60	.99	3.48	1.07	3.07	1.13
User-Based	**3.83**	**.50**	**3.96**	**.55**	**3.92**	**.57**	**3.89**	**.62**
Students are better off having taken the course	4.12	.63	4.22	.56	4.26	.67	4.21	.75
Courses are helpful to students' careers	4.07	.68	4.16	.60	4.21	.63	4.19	.73
Student needs are fulfilled	3.97	.51	3.72	.90	3.89	.70	3.70	.76
Courses are adjusted to meet student needs	3.47	.91	3.93	.86	3.74	.92	3.82	.92
Courses are adjusted to student interests	3.52	.86	3.77	1.01	3.50	.94	3.54	.92

[a] 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Table 1: Continued

Factors and abbreviated items	Students				Faculty			
	On-Campus		Off-Campus		On-Campus		Off-Campus	
	Mean[a]	SD	Mean[a]	SD	Mean[a]	SD	Mean[a]	SD
Value-Based	**3.86**	**.55**	**3.85**	**.66**	**4.09**	**.56**	**4.00**	**.62**
Courses are valuable to students	4.07	.56	4.12	.62	4.17	.59	4.05	.66
Students receive quality instruction at an acceptable cost	3.71	.85	3.42	1.05	4.10	.73	3.88	.86
What is learned will have long-term usefulness	3.79	.76	4.01	.71	4.01	.81	4.06	.85
Transcendent	**4.14**	**.49**	**3.91**	**.62**	**4.08**	**.55**	**3.77**	**.67**
Courses project a positive image of the institution	4.17	.54	4.00	.83	4.12	.70	4.04	.78
Courses have a reputation of high quality	4.16	.56	3.91	.76	4.10	.62	3.65	.86
Level of course quality is acceptable to the public	4.09	.62	3.83	.66	4.02	.74	3.65	.85
Overall Mean	**3.94**	**.39**	**3.89**	**.50**	**3.99**	**.52**	**3.78**	**.54**

[a] 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Table 2: Comparing courses delivered by distance education technologies to courses taught on-campus

Factor	Less		Equal		Greater	
	S	F	S	F	S	F
Relevance to students	7.5	8.7	65.4	65.3	27.1	26.0
Amount of material covered	11.2	42.9	80.4	50.8	8.4	6.3
Level of organization	25.2	7.9	51.4	47.2	23.4	44.9
Amount of teacher-student interaction	70.1	87.0	22.4	9.2	7.5	3.8
Amount of student-student interaction	86.8	87.0	9.4	9.9	3.8	3.1

Note. Values presented are percentages. S = students. F = faculty.

Table 3: Comparing students who enroll in off-campus courses with those who study on-campus

Factor	Less		Equal		Greater	
	S	F	S	F	S	F
Level of academic ability	3.7	30.5	72.0	62.5	23.4	6.9
Level of relevant work experience	2.8	4.6	17.8	16.8	79.4	78.6
Level of background in prerequisite courses	16.2	66.4	72.4	30.5	11.4	3.1
Likelihood of completing the course on time	15.1	39.2	64.2	56.9	20.8	3.8
Likelihood of submitting assignments on time	25.5	38.0	59.4	56.6	15.1	5.4
Likelihood of using library resources	80.2	87.0	8.5	11.5	11.5	1.5

Note. Values presented are percentages. S = students. F = faculty.

- I wrote the professor e-mails asking questions and for clarification and never got an answer. The video class was poorly organized, the tapes were very poorly videoed, the printed materials came six weeks after the start of class and videos came three weeks after the start of class.
- The off-campus class I am taking is very unorganized as far as syllabus content, test dates, and receiving our materials back. Instructor assumes we have Internet access, but we don't! The taped lectures we watch have poor sound quality and the camera isn't always focused. They are extremely boring to watch!

Conclusions and Recommendations

Faculty and students provided a positive assessment of the overall quality of both on- and off-campus courses. They also provided a positive assessment of both on- and off-campus courses on the manufacturing-based, user-based, value-based, and transcendent-based quality factors. Even so, both students and faculty perceived off-campus courses to be of lower quality than on-campus courses with the greatest difference on the transcendent quality factor. Overall, results of this study strongly support the conclusions and recommendations made by Miller et al. (1998), while adding some additional insight.

Students indicated that off-campus courses were superior to on-campus courses on the user-based quality factor and equal to on-campus courses on the value-based factor. Faculty also rated these factors relatively high for off-campus courses. It was concluded that off-campus courses are fulfilling important educational needs. Faculty and administrators should maintain their commitment to providing courses that are adapted to the needs and interests of

off-campus learners. Courses that are student-centered will more likely have long-term usefulness to the characteristically practical off-campus learner.

Students rated on-campus courses higher than off-campus courses on the manufacturing-based quality factor as did faculty. Relative to faculty, students were more positive about off-campus course quality. Clearly the focus for improving the quality of off-campus courses must be on the manufacturing-based factor. When the production and delivery processes are handled correctly and aligned to achieve outcomes based on student needs, off-campus courses will be recognized for innate excellence (transcendent quality). Based on faculty data, Miller et al. (1998) emphasized the need for faculty development and support to enhance quality. Their recommendation is supported by this study, but student data suggest that many needed improvements are beyond faculty control. If quality off-campus courses in agriculture are to be offered, attention must be given to improving the production, quality control, and distribution systems for courses and course materials. In addition, efforts are needed to enhance course enrollment policies and procedures. As the production and delivery of off-campus courses improves, a reputation of quality will develop and enrollment will likely grow.

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A Critique By:
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Off-Campus Students and Agriculture Teaching Faculty Perceptions of the Quality of On- and Off-Campus Courses

In addition to rigor, the perception of quality is often an issue for discussion when faculty and students discuss the merits and demerits of off-campus courses. As in the previous paper that addressed rigor, this paper reports perceptions of students and faculty regarding on-campus and off-campus courses. The researchers admit that quality is a rather abstract term, but they adequately identify how the term is used in this study and draw from appropriate literature.

Just a few somewhat technical concerns cloud the report. The problem statement could be written more clearly. The assumed problem is that quality is an important issue in all courses, and that there may be a perception that off-campus courses lack quality. Such a perception must be addressed if we are to expect faculty to be a part of off-campus delivery and if we want students to recognize that off-campus courses are just as "good" as on-campus courses. The introduction of TQM principles and students' needs just prior to the purpose of the study tends to create some confusion. This may have been intended to lead to the third objective regarding student and course characteristics, but that connection is not readily apparent.

The procedures used in conducting the study are clearly described and appropriate. The researchers report that there may be a concern with the generalizabilty of certain results due to potential non-response bias. Reminding the reader of this concern in the results section of the paper (Table 2) would also be appropriate. We could also discuss whether the difference between respondents and non-respondents on three items jeopardizes our trust in their responses to any other items. How many differences must there be before we declare that the groups are different?

The results of the study are presented in a clear and understandable manner. In discussing those results, the researchers may tend to over-emphasize differences. While differences do exist, course quality perceptions tended to be in the "agree" category consistently. No ratings fell below the mid-point of the scale, so any needed change may be classified as fine-tuning as opposed to major overhaul.

The use of the results of this study by others is severely limited. Iowa State (the assumed setting for the study) employs a variety of delivery methods that may be classified as "off-campus." The anecdotal student comments (which add to the discussion) tend to lead the reader to believe that the only delivery mode utilized was video tape. Therefore, the results may be applicable only to asynchronous course delivery using video tape, and not other distance delivery modes such as web-based courses or class sessions conducted away from the main campus.

Predictors of Student Retention in Colleges of Agriculture

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Introduction and Theoretical Framework

One of the major problems plaguing college administrators nationwide is the recruitment and retention of quality students who are likely to enter the agricultural industry upon graduation. Precluding this problem were the dramatic decreases in enrollment in colleges of agriculture in reaction to the farm crisis of the early 1980s. During this period of time, enrollments in agriculture programs at both the high school and university levels underwent major changes (Dyer & Osborne, 1994). In no areas were the repercussions greater than in those states whose economies were most closely tied to the agricultural sector. Hardest hit were states in the Midwest whose agricultural economies depended upon the successful production and marketing of grain crops which were tied to government subsidies. Likewise in the Midwest, some of the most drastic decreases in high school agriculture program enrollments were reported. In Illinois, enrollments decreased by over 60% (Illinois State Board of Education, 1993), while Iowa experienced a decrease of nearly 53% from 1976 to 1990 (Iowa Department of Education, 1997). Over the same time period, enrollment in Illinois and Iowa public schools decreased by 25% and 20%, respectively, indicating that other factors were contributing to the attrition in agriculture program enrollments (United States Department of Education [USDE], 1996).

As the effects of the decreases in high school enrollments rippled to the university level, Manderscheid (1988) reported a 24% decline in Land Grant University agriculture enrollments and a 13% decrease in non-Land Grant University agriculture enrollments from 1978 to 1988. Paralleling this decrease in university agriculture program enrollments were cutbacks in faculty positions. According to the American Association for Agricultural Education (AAAE), university agricultural education faculty membership decreased from a 1984 high of 326 members to a 1995 low of 254 members, a decrease of 22% (AAAE, 1996).

Interestingly, as universities were responding to decreased student numbers by downsizing agricultural education departments and programs, high school enrollments in agriculture courses were rebounding. Several states modernized agriculture curricula as suggested by the National Research Council (1988) and reaped almost immediate results in the form of increased student numbers. At an enrollment of nearly 3/4 million students in 1993-94 (USDE, 1996), high school agricultural education program enrollments have recovered to the record pre-recession enrollments. Given the national decrease of over 20% in the number of school age children (USDE), the case could easily be made that agricultural education at the high school level is actually healthier than at the pre-recession era.

At the university level, colleges of agriculture are also reporting increased enrollments. Litzenberg, Whatley, and Scamardo (1992) reported that with the exception of the North Central Region, agricultural enrollments had recovered to early 1980 levels. According to USDE numbers, 1992 enrollments in colleges of agriculture nationwide have increased by 18.9% over the 1981 enrollment of 802,000 students (USDE, 1996). However, the demographic composition of today's college of agriculture students has changed in many instances from that of the 1980s. Dyer, Lacey, and Osborne (1996) reported that 66.4% of freshmen in the College of Agriculture at the University of Illinois at Urbana-Champaign (UIUC) were from urban areas. Even in Iowa, a state with a low population density, Scofield (1995) noted an increase in urban backgrounds of College of Agriculture freshmen at Iowa State University (ISU) in 1994.

According to Russell (1993), this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. Russell warned of an impending "brain drain" in the agricultural industry if the loss of individuals trained and experienced in agriculture continues.

With an increasing number of freshmen coming from urban backgrounds, and/or situations in which they have no pre-college training in agriculture, new problems have emerged. Dyer et al. (1996) reported a loss of nearly 11 million dollars of instructional money in one situation. This loss was largely due to students with higher academic credentials, but no agricultural experience, being admitted to a college of agriculture and then dropping out before graduation.

The overall problem continues to be how to accurately identify and retain students who are likely to complete a program of instruction and seek employment in the industry of agriculture. This research seeks to address this problem.

The conceptual model for this research emphasized the need to study those factors that influence a student's selection and pursuit of a field of study and corresponding career choice. Fishbein and Ajzen (1975) provided the theoretical framework for this study. They determined that intentions to participate in an activity could be predicted based upon knowledge, observation, or other information about some issue. This suggests that a person's intent to pursue study in a field of agriculture, or to become actively involved in an agricultural career, may be predicted by analyzing his/her beliefs about agriculture. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate them positively.

Purpose

The primary purpose of this study was to identify those factors that most accurately predict a student's intention to complete a degree in a college of agriculture. Specific research objectives were to:

1. Identify similarities and differences of college of agriculture freshmen from predominately urban backgrounds, as compared to those in an institution with students predominately from rural backgrounds.
2. Determine the relationship between a student's intention to change colleges and majors and selected demographic variables (gender, grade point average, ACT score, geographical background, experience in agriculture, enrollment in high school agriculture, membership in FFA and 4-H, and class rank).
3. Determine if a combination of perceived effect components could explain the variance in students' retention plans.

Procedures

The study employed a descriptive-correlational research design. Data were compiled from college of agriculture freshmen at Land Grant universities in two Midwestern states – Illinois and Iowa – during the 1995-96 and 1996-97 school years (N = 1008). These states were selected because of differences in admission procedures of freshmen (UIUC has a capped enrollment whereas ISU utilizes an open enrollment philosophy), because of the close relationship between agriculture and local and state economies, and because of the variance in geographic background of the students who comprise the population.

Student rosters from each college of agriculture's admissions office served as the population frame for the study. Students were surveyed in freshmen introductory courses and were mailed questionnaires as outlined by Dillman (1978). A total of 725 (71.9%) usable instruments were collected. Ten percent of the non-respondents in each phase of the study were randomly selected and completed questionnaires by telephone. No significant differences were found in data obtained from non-respondents and that obtained from initial participants. Therefore, data were generalized to the entire population.

Instruments used in the study were developed by Dyer et al. (1996). Content and face validity were determined by a panel of experts from the University of Illinois College of Agriculture faculty. Part I of the instrument contained demographic information, close-ended, and partially close-ended items. Part II identified attitudes of students toward

the field of agriculture. A five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree) was used for the 21 items comprising Part II of the questionnaire. The instrument was pilot tested using 12 freshmen students not enrolled in the College of Agriculture and 11 sophomore and junior College of Agriculture students (n = 23). Part II of the instrument was divided into three constructs: Attitudes Toward Agriculture as an Area of Study, Attitudes Toward High School Agriculture Programs, and Attitudes Toward University Agriculture Programs. Reliability estimates were determined for the three constructs using Cronbach's Alpha (r = .85, .78, .88, respectively). Data were analyzed using SPSS for Windows. Descriptive statistics, including measures of central tendency and variability, were used to simplify and characterize data. Regression analysis was used to explain variance in factors influencing students' intentions. Spearman's rho correlation coefficient was used to determine intercorrelations of ordinal data. Independent variables included class rank, ACT score, grade point average, gender, geographic background, experience in agriculture, membership in 4-H and FFA, and enrollment in high school agriculture programs. The dependent variable was student intention to change college. An alpha level of .05 was set a priori.

Results

Objective 1: Identify similarities and differences of freshmen in a college of agriculture with students predominately from urban backgrounds, as compared to those in an institution with students predominately from rural backgrounds.

The populations of students in the two colleges differed in gender, ethnicity, and agricultural background/experience. As noted in Table 1, most students in the urban setting (UIUC) were female and Caucasian. Whereas most students in the rural setting (ISU) were also Caucasian, the sample differed in that a majority of the rural students were male, with an almost non-existent presence of African-American, Hispanic, or Asian ethnicity/ancestry.

Table 1: Comparison of Attitudes of Freshmen From Rural and Urban Backgrounds

	Rural (ISU)	Urban (UIUC)
Gender		
Female	44.4 (143)	55.6 (179)
Male	57.0 (222)	43.0 (167)
Ethnicity		
Caucasian	97.2 (369)	90.7 (283)
Asian	1.0 (4)	5.4 (17)
African-American	1.3 (5)	1.9 (6)
Hispanic	0.5 (2)	1.3 (4)
Other	1.8 (7)	0.6 (2)
High School Agriculture Completed	54 .0(214)	18.4 (59)
FFA	47.0 (182)	13.8 (44)
4-H	55.2 (214)	27.3 (86)
Geography		
Urban (over 10,000)	23.7 (94)	66.4 (215)
Small towns (<10,000) & Rural areas	28.8 (114)	11.4 (37)
Farm	47.5 (188)	22.2 (72)
Experience in Agriculture		
Paid	5.6 (22)	25.8 (66)
Unpaid	11.6 (46)	18.0 (46)
Both Paid and Unpaid	66.4 (263)	25.0 (64)
None	16.4 (65)	31.2 (80)
Attitudes Toward Programs of Study		
Plan to Change Colleges	5.9 (22)	39.4 (195)
Plan to Change Majors	17.3 (61)	48.2 (66)

Less than one in five students in the Illinois study indicated that they had completed high school agriculture courses. By contrast, 54% of respondents in Iowa reported having completed at least one high school agriculture course. Of the Illinois students who had completed courses in high school agriculture programs, over three-fourths rated the program "Good." Only 6.9% rated the programs as "Poor." In Iowa, 62.1% of the respondents who had completed high school agriculture classes rated the programs as "Good" while only 7.5% rated the quality "Poor." The major reason listed in both states for not enrolling in high school agriculture courses was that no program was offered.

Less than 14% of the students in Illinois indicated they had been FFA members in high school compared to almost half (47%) of the respondents in Iowa. Approximately one-fourth of the Illinois respondents reported membership in 4-H as compared to over half of the Iowa respondents.

In a review of literature, Scofield (1995) reported a largely rural student population at ISU, whereas Dyer et al. (1996) reported a majority of Illinois students to be from urban or suburban backgrounds. This study confirmed those earlier findings. In Illinois, two-thirds (66.4%) of the respondents reported they were from large or medium urban areas whereas three-fourths of the Iowa respondents reported farm, rural, or small town backgrounds.

Iowa freshmen also indicated that they had considerably more experience in agriculture prior to admission to the College of Agriculture. Roughly two-thirds (66.4%) of Iowa students indicated they had both paid and unpaid experiences in agriculture, whereas only 16.4% indicated they had no agricultural experience prior to enrolling. By comparison, 25.8% of the students in Illinois reported paid work experience in agriculture, whereas 31.3% reported no prior experience of any kind with agriculture.

Students' attitudes toward their major area of study differed markedly between the two institutions involved in the study. In the Illinois school, 39.4% of the freshmen indicated they planned to leave the College of Agriculture. An additional 48.2% indicated they were contemplating a change of majors before graduating. By comparison, only 5.9% of the respondents at ISU indicated they were planning a change of college. Only 17.3% were contemplating changing majors.

The one area of similarity was in the question asking students to list what they most liked about their respective College of Agriculture. Students in both institutions listed the "friendly atmosphere" in the college and the "faculty" as their first and second choices, respectively.

Objective 2: *Determine the relationship between a student's intention to change colleges and majors and selected demographic variables (gender, grade point average, ACT score, geographical background, experience in agriculture, enrollment in high school agriculture, membership in FFA and 4-H, and class rank).*

Tables 2 and 3 present the correlation matrix for variables under consideration (experience in agriculture, gender, geographic background, grade point average, ACT score, membership in FFA, membership in 4-H, class rank, intent to change colleges). Ethnicity/race was dropped from consideration due to lack of variance (IL = 90.7% Caucasian, 1.9% African-American, 5.4% Asian, 1.3% Hispanic; IA = 97.2% Caucasian, 1.3% African-American, 1.0% Hispanic, and .5% Asian).

Table 2: Intercorrelations of Demographic Variables of UIUC College of Agriculture Freshmen

Variable	Intercorrelations									
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
Class Rank (X_1)	1.00	-.167	-.576	.086	-.548	-.471	-.416	-.344	-.293	-.375
ACT (X_2)		1.00	.183	.035	.020	-.013	-.061	-.057	-.011	-.082
GPA X_3			1.00	.003	.292	.144	.204	.124	.041	-.162
Gender[a] (X_4)				1.00	-.225	-.233	-.124	-.284	-.256	.027
Geography[b] (X_5)					1.00	.523	.541	.420	.318	-.266
Ag Experience[c] (X_6)						1.00	.511	.468	.398	-.355
4-H member[d] (X_7)							1.00	.442	.371	-.301
FFA member[d] (X_8)								1.00	.857	-.294
High school Ag.[d] (X_9)									1.00	-.318
Change College[d] (Y)										1.00

[a]1 = male, 2 = female

[b]1 = Large metropolitan (>100,000); 2 = Urban (50,000 - 99,999); 3 = Medium urban (10,000 - 49,999); 4 = Small town (<10,000); 5 = Rural, but not farm; 6 = Farm

[c]1 = none, 2 = paid experience, 3 = unpaid experience, 4 = both paid and unpaid experience

[d]1 = no, 2 = yes

Table 3: Intercorrelations of Demographic Variables of ISU College of Agriculture Freshmen

Variable	Intercorrelations									
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
Class Rank (X_1)	1.00	-.355	-.648	.071	.186	-.093	-.121	-.090	-.061	.041
ACT (X_2)		1.00	.473	.147	.221	-.179	-.026	-.136	-.184	.078
GPA (X_3)			1.00	.247	.089	-.089	.009	-.024	-.052	.016
Gender[a] (X_4)				1.00	.209	-.292	-.003	-.077	-.077	.119
Geography[b] (X_5)					1.00	.581	.476	.423	.434	.170
Ag Experience[c] (X_6)						1.00	.370	.423	.438	-.251
4-H member[d] (X_7)							1.00	.354	.298	-.146
FFA member[d] (X_8)								1.00	.814	-.173
High school Ag.[d] (X_9)									1.00	-.140
Change College[d] (Y)										1.00

[a]1 = male, 2 = female

[b]1 = Large metropolitan (>100,000); 2 = Urban (50,000 - 99,999); 3 = Medium urban (10,000 - 49,999); 4 = Small town (<10,000); 5 = Rural, but not farm; 6 = Farm

[c]1 = none, 2 = paid experience, 3 = unpaid experience, 4 = both paid and unpaid experience

[d]1 = no, 2 = yes

In the Illinois phase of the study (Table 2), moderate associations (Davis, 1971) were identified between the criterion variable (student intention to change college) and the variables class rank (r = .375), experience in agriculture (r = -.355), membership in 4-H (r = -.301), and enrollment in high school agriculture classes (r = -.318). Low correlations were found between the criterion variable and GPA (r = -.162), geographical background of students (r = -.266), and membership in FFA (r = -.294).

In the College of Agriculture at UIUC, students with higher class ranks (i.e., 1st in their high school class) and higher GPAs were more likely to drop out of the College than were students ranked lower in their classes or who had lower grade point averages. However, students with experience in agriculture, who were enrolled in high school agriculture classes, who were 4-H or FFA members, or who were from less populated areas were more likely to complete their degrees within the College.

Weaker relationships were identified in the Iowa portion of the study, however, the same trends prevailed. Class rank

had only a negligible relationship to students' intention to change college (r = .041). Low associations were found between the criterion variable and geography (r = .170), experience in agriculture (r = -.251), membership in 4-H (r = -.146), membership in FFA (r = -.173), and enrollment in high school agriculture (r = -.140).

Objective 3: *Determine if a combination of perceived effect components could explain the variance in students' retention plans.*

Stepwise multiple regression was used to determine which, if any, of the variables were significant predictors of students' intentions to remain enrolled in their respective college of agriculture. Table 4 indicates that students' prior experience in agriculture and enrollment in high school agriculture programs were significant predictors of their intention to continue their education in the UIUC College of Agriculture, explaining 17% of the variance. Likewise, Table 4 indicates that students' prior experience in agriculture was the only significant predictor of their intention to matriculate in ISU's College of Agriculture, but explained only 7% of the variance.

Table 4: Multiple Regression of Student Intent on Variables of Interest[a] of UIUC Freshmen.

Predictor	B	SE B	β	t
Experience in Agriculture	-7.300	.035	-2.060	-2.060*
High School Agriculture	-.674	.300	-2.249	-2.249*

Note. R^2 = .17. *p<.05.

[a] = experience in agriculture, high school agriculture, geographic background, membership in FFA, membership in 4-H.

Table 5: Multiple Regression of Student Intent on Variables of Interest[a] of ISU Freshmen.

Predictor	B	SE B	β	t
Experience in Agriculture	-3.700	.018	-.136	-2.010*

Note. R^2 = .07. *p<.05.

[a] = experience in agriculture, high school agriculture, geographic background, membership in FFA, membership in 4-H.

Conclusions and Recommendations

Care should always be taken in generalizing findings to populations other than those sampled. With this limitation in mind, and based upon the findings of this study, the following conclusions were drawn and recommendations made:

Freshmen in the two institutions comprising the study differed greatly in background and levels of agricultural experience. Illinois students were generally more urban or suburban in their background, lacked agricultural experience, had little or no high school agriculture classroom experience, and were more ethnically diverse than were the Iowa respondents. By contrast, Iowa students generally had farm, rural, or small town backgrounds and considerable agricultural experience, including enrollment in high school agriculture programs.

Students who have experience in agriculture, completed high school agriculture courses, been FFA and/or 4-H members, and lived in a rural setting are more likely to complete a degree in a college of agriculture than are freshmen who have not had those experiences. By contrast, students with higher class ranks and higher GPAs are more likely to drop out of colleges of agriculture than are students with agricultural experience or students who have completed high school agriculture coursework.

Students' prior experience in agriculture and possibly their enrollment in high school agriculture programs are the best predictors of their intention to continue their education in a college of agriculture. According to the results of this

research, students who have agricultural experience prior to enrolling in college represent the best investment by colleges of agriculture.

Colleges should recruit students who have agricultural experience, whether that experience is gained through background or high school agriculture experiences. If the mission of colleges of agriculture is to produce graduates for entry into the agricultural industry, valuable resources are being wasted if those graduates do not complete their program of study. Improvement needs to be made in both the identification and retention of students who are accepted into colleges of agriculture.

This study should be replicated on a national level with an emphasis on explaining a greater percentage of variance in students' reasons for changing colleges and/or majors.

Implications

Many colleges of agriculture identify and recruit students based solely upon ACT score, grade point average, and class rank. These institutions are likely using the wrong criteria for selection – if student retention is an aim. When identifying and recruiting students for admission to colleges of agriculture, more emphasis should be placed on students' agricultural experience and/or transcript evidence of enrollment in high school agricultural education courses.

When students with no agricultural experience are admitted in a capped enrollment environment, the mission of the college of agriculture may be forced to change. Bekkum (1993) noted that the agricultural industry places considerable importance on the background and experience of graduates. However, students are not entering some colleges of agriculture with the agricultural experience desired by prospective employers. If colleges of agriculture are to be a reliable source of students, those colleges must either be more selective in their recruitment of students or design a curriculum to provide agricultural experience at the university level. Where the mission was once the education of students in agriculture, the emerging trend may be to educate students about agriculture.

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Predictors of Student Retention in Colleges of Agriculture

The purpose of this study was to identify factors that most accurately predicted a student's intention to complete a degree awarded by a college of agriculture. The specific objectives of the study were appropriate. This study was an extension of previous research by the authors and others.

A convenience sample was used, thus the sample actually became the population for the study. The authors carefully acknowledged limitations to generalizing findings beyond those individuals participating in the study. This writer does wonder; however, why an alpha level of .05 was set a priori? Since this was a nonprobability sample, why was hypothesis testing used since a rather important assumption for the use of inferential statistics is a probability sample?
Validity and reliability estimates were given for the measurement instrument and correct procedures and statistical estimates were given. A point of general concern is that reliability was partially established by non-agriculture students when the instrument was used by agriculture students. Since reliability is non-test specific but rather group-specific, the estimates for the reliability coefficients could be inaccurate leading to increased measurement error. While the authors provided information concerning the measurement instrument used for summated attitude scales, this writer could not see that any summated attitude scales were used in the analysis.

In the results section of the paper, Table 1 is entitled, "Comparison of Attitudes of Freshman From Rural and Urban Backgrounds." However, the table only provides demographic information. The correlations reported in Tables 2 and 3 also pertain only to demographic data and not attitudes. This writer would also question the use of Spearman's Rho as the appropriate correlation statistic with nominal and interval data. The most serious question raised by this writer is why was multiple regression analysis used when the dependent variable was a dichotomous nominal variable? The appropriate analysis should have used logistic regression analysis or discriminant analysis. Serious violations of the assumptions for multiple regression are caused when one uses a nominal dependent variable. Three of the more serious ones are 1)non-linear, 2) unequal variance of the residuals, and 3) the estimate for partial regression coefficients can take on values less than zero and greater than one. This doesn't make sense conceptually when we have a dichotomous variable that has the values of zero and one. Probably the most troublesome of the violations is that multiple regression assumes homogeneity of variance of the residuals about the regression line. When one is dealing with probabilities or proportions (whether one is in group zero or one), it can be shown that the mean and standard deviation are related. The distribution of a proportion with p as its mean has a standard deviation of the square root of $((p)*(1-p))$. Since there is a functional relationship between the standard deviation and the mean, homogeneity can not be assumed.

In summary this paper was not able to fulfill its purpose to identify factors that most accurately predicted a student's intention to complete a degree awarded by a college of agriculture. A closer attention to the assumptions needed for using multiple regression procedures could have allowed this paper to make a significant contribution to the literature base. I would strongly encourage the authors to redo the analysis using logistic regression procedures.

Predictors of Student Achievement in an Introductory Agricultural Economics Course

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Introduction

For many instructors, the literature regarding the influence of learning style on student performance has brought forward an issue of "teacher effectiveness." Researchers have suggested that learning style is influential in students' academic achievement (Witkin, 1973, Gregorc, 1979; Garger & Guild, 1984). Dunn and Dunn (1979) and Claxton and Murrell (1987) reported that when students' learning styles were addressed, an outcome was greater achievement.

Learning style has been defined as . . . "distinctive behaviors which serve as indicators of how a person learns and adapts to his/her environment" (Gregorc, 1979, p. 234). Turner (1985) and Schroeder (1993) suggested that having knowledge regarding the learning style of students can assist educators in improving curricula and selecting instructional materials, as well as enhancing teaching methods and learning activities. Similarly, Griggs (1991) concluded that instructor understanding of the learning process was critically important to student educational improvement. Other researchers have reported on the diversity of student learning styles in higher education (Schroeder,1993; Anderson & Adams, 1992). Hence, many educators have expressed the need to question if their repertoire of teaching methodologies effectively met the diversity of learning styles being brought to the educational experience.

One of the most extensively researched learning style construct has been field-dependence/field-independence (Kogan, 1971; Guild & Garger, 1985). Chickering (1976) specifically noted that the field-dependence/independence dimension had major implications for faculty who make decisions about learning environments and practices. This dimension categorizes individuals as having a preferred learning style of either field-dependent or field-independent. According to Witkin, et al. (1977), field-dependent learners thrive best in structured social environments, think globally, have difficulty solving problems and are extrinsically motivated. In contrast, field-independent learners prefer individual effort and study, are analytical thinkers, enjoy problem solving and tend to be intrinsically motivated (Witkin, et al., 1977).

While some research has been applied to assist educators in developing instructional methods that were compatible with students' preferred learning style (Keefe, 1982; Keefe & Ferrell, 1990), many educators are still presented with a challenge "to assess the learning style characteristics of students [in order to] provide learning opportunities that are compatible with those characteristics" (Garton, Thompson & Cano, 1997).

The literature revealed that some research has been conducted on describing the preferred learning style of university students (Anderson & Adams, 1992; Torres & Cano, 1994) and the interaction of teaching approach and learning style on student achievement (Honeyman & Miller, 1998). Torres (1993) reported that learning style influenced

students' cumulative grade point average, while Cano and Porter (1997) concluded that students who preferred a field-independent learning style were more successful in higher education.

The previous research has identified students' learning style and how learning style was associated with academic performance. However, information is lacking that explains the influence that learning style may potentially have on student achievement in an individual course. Furthermore, what student characteristics are the best predictors of achievement? Possessing this knowledge could potentially provide educators with valuable information needed to identify student learning needs.

Purpose and Objectives

The purpose of this study was to determine if the instructor of an "Introduction to Agricultural Economics" course was meeting the diverse learning needs of the students enrolled in the course. In addition, the study sought to identify the factors that most accurately predicted students' success in the introductory agricultural economics course. The specific objectives were to:

1. Identify the preferred learning style of students.
2. Describe the relationship between learning style and academic performance as determined by quiz scores, group projects, examinations, and final course percentage.
3. Define the variance in student achievement, as defined by final course percentage, accounted for by learning style and students' prior knowledge and skills.

Procedures

Population and Sample

The target population for this ex post facto correlational study consisted of students in the College of Agriculture, Food and Natural Resources at the University of Missouri-Columbia. A purposive sample of an intact group of students who were enrolled in the "Introduction to Agricultural Economics" course (n=139), was used for the study. This introductory course is required by all students, regardless of major, within the college.

Nonprobability sampling was used based upon the context of the study (Greenfield, 1996; Grosof & Sardy 1985; Judd, Smith & Kidder,1991; Gay, 1996). To assist in nonbias sampling, a comparison of university admissions criteria, including high school class rank and ACT scores, was used to determine that the characteristics of the sample appropriately reflected the population (Greenfield, 1996; Grosof & Sardy, 1985).

Instrumentation

To assess the preferred learning style of students, the Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin & Karp, 1971) was administered. The GEFT is a standardized instrument that has been used in educational research for more than 25 years (Guild & Garger, 1985). The validity and reliability of the GEFT was established by the instrumentlls developers (Witkin, Oltman, Raskin & Karp, 1971). Validity was established by determining the GEFT's relationship with the "parent" test, the Embedded Figures Test, the Rod and Frame Test and the Body Adjustment Test (Witkin, et al., 1971). As the GEFT is a timed test, internal consistency was measured by treating each section as split-halves (Spearman-Brown reliability coefficient of .82 was obtained).

As a result of the GEFT, preferred learning style was recorded as field-dependent or field-independent. The range of possible scores on the GEFT was 0 to 18, with a national mean score of 11.4. Individuals scoring from 0 to 11 were considered to lean toward a field-dependent learning style and those scoring greater than 11, a preference toward the field-independent learning style.

Analysis of Data

During the second week of the semester, the GEFT was administered to students enrolled in the Introduction to Agricultural Economics course. The treatment consisted of one full semester of instruction on agricultural economics by a single professor. At the close of the semester, four performance scores - total quiz score, total exam score, group project score and the final course percentage - were obtained on students completing the course.

Descriptive statistics were generated on students' prior knowledge and skills (grade point average, ACT scores, and high school class rank), and GEFT scores. Pearson product-moment correlation coefficients were calculated between GEFT scores and academic performance and were interpreted using Davis' (1971) descriptors. Regression analysis was used to explain variance in students' final course percentage accounted for by learning style, and students prior knowledge and skills. An alpha level of .05 was set a priori.

Results

An analysis of the preferred learning style of students enrolled in the introductory agricultural economics course indicated that GEFT scores ranged from 2 to18 with an overall mean score of 13.7 (SD = 4.02) (Table 1). As a group, 74% (n = 103) preferred a field-independent learning style, while 26% (n = 36) preferred field-dependence.

A gender analysis revealed that females had a slightly higher preference for the field-independent learning style at 77% (n = 56) compared to 71% (n = 47) of the males. Conversely, 29% (n = 19) of the males and 23% (n = 17) of the females preferred a field-dependent learning style. The mean GEFT scores for males was 13.9 (SD = 4.06) and for females, 13.5 (SD = 3.99).

Table 1: Preferred Learning Style by Gender (n = 139)

	Field-Dependence		Field-Independence		GEFT	
	n	%	n	%	Mean	SD
Male (n= 73)	19	28.8	47	71.2	13.9	4.06
Female (n=66)	17	23.3	56	76.7	13.5	3.99
Total	36	25.9	103	74.1	13.7	4.02

The second objective sought to describe relationships between learning style and academic performance in the introductory agricultural economics course. A low positive and significant relationship (r = .22) was found between students' preferred learning style and students' total exam score (Table 2). No significant relationships were found between the remaining academic performance variables (total quiz score, group project score, and final course percentage) and students' learning style.

Table 2: Relationship Between Learning Style (GEFT) and Academic Performance

Academic Performance	r
Total Quiz Score	.12
Total Exam Score	.22*
Group Project Score	-.01
Final Course Percentage	.16

Note. Pearson product-moment correlation coefficients.
* $p < .05$

Prior to conducting regression analysis, a correlation matrix was developed to reveal the presence of multicollinearity - a potential violation of the assumption in using multiple linear regression (Table 3). Using guidelines offered by Lewis-Beck (1980) to combat multicollinearity, bivariate correlations near .8 are potential threats and should be removed prior to conducting regression analysis. ACT math, ACT science, ACT English, and ACT social science were all excluded from consideration in the regression equation due to their very strong relationship with ACT composite score.

Multiple regression, using simultaneous entry, was used to explain the variance in students' final course percentage accounted for by learning style and students' prior knowledge and skills. Sixty-five percent of the variance in final course percentage (grade) could be explained by a linear combination of cumulative grade point average and high school class rank (Table 4). Variables not entering the regression equation included learning style and ACT composite score.

Table 4: Regression (Simultaneous Entry) of Final Course Percentage on Variables of Interest[a]

Variable	R^2	b	F	P
Cumulative GPA	.65	5.9	42.6	.00*
High school class rank		.11	9.7	.01*
(Constant)		45.6	330.9	.00*

Note. For Model: F = 59.69; *p < .05

[a]Learning style (GEFT), cumulative GPA, ACT composite, high school class rank

Conclusions and/or Recommendations

Three-fourths of the students in the introductory agricultural economics course possessed a preference for the field-independent learning style. This finding was consistent with previous research that found that a majority of college of agriculture students preferred a field-independent learning style (Torres & Cano, 1994; Cano & Porter, 1997).

Both male and female students preferred a field-independent learning style. A slightly higher percentage of females than males leaned toward a field-independent learning style. This finding is not consistent with previous research. Torres and Cano (1994) reported that a majority of female agriculture students leaned more toward a field-dependent learning style. Furthermore, the findings of the current study contrasts previous research (Garger & Guild, 1984; Witkin, et al., 1977; Claxton & Murrell, 1987) that found persistent gender differences in the field-dependence/independence dimension with females leaning more toward a field-dependent learning style.

The overall mean GEFT score was 13.7, which was considerably above the established norm of 11.4 (Witkin, et al., 1977). Consequently, if the instructor had assumed his students would follow the national norm and tailored his teaching methods to a more field-dependent learning style could this have had an impact on the instructor's teaching performance and student achievement?

A low positive relationship was identified between students' GEFT scores and their total exam score. Although the relationship was low it was in the positive direction indicating that as students moved from the field-dependent end of the learning style continuum to the field-independent end, their achievement on course exams increased. With a positive relationship between GEFT score and total exam score it is recommended that the instructor consider modifying the exams to accommodate the learning preferences of learners leaning toward the field-dependent end of the continuum. This could include reducing the use of forced choice questions and incorporating more essay or open-ended questions in the exams. It is also suggested that the instructor consider offering a variety of exam formats to reach the various learning needs of students in the course.

Table 3: Intercorrelations of Variables

Variable	(X_1)	(X_2)	(X_3)	(X_4)	(X_5)	(X_6)	(X_7)	(X_8)	(Y_1)	(Y_2)	(Y_3)	(Y_4)
GEFT (X_1)	1.00											
Cumulative GPA (X_2)	.28*	1.00										
ACT composite (X_3)	.25*	.56*	1.00									
ACT math (X_4)	.41*	.54*	.80*	1.00								
ACT science (X_5)	.26*	.38*	.77*	.62*	1.00							
ACT English (X_6)	.21*	.53*	.79*	.61*	.63*	1.00						
ACT social science (X_7)	.18	.53*	.85*	.65*	.76*	.73*	1.00					
High school class rank (X_8)	.12	.60*	.53*	.52*	.32*	.55*	.45*	1.00				
TQS (Y_1)	.12	.59*	.40*	.49*	.29*	.30*	.32*	.65*	1.00			
TES (Y_2)	.22*	.68*	.47*	.55*	.46*	.47*	.47*	.54*	.72*	1.00		
GPS (Y_3)	-.01	.35*	.11	.16	.01	.16	.06	.30*	.56*	.43*	1.00	
FCP (Y_4)	.16	.73*	.43*	.51*	.36*	.40*	.38*	.65*	.88*	.90*	.71*	1.00

Note. Pearson product-moment correlation coefficients
TQS = Total Quiz Score; TES = Total Exam Score; GPS = Group Project Score; FCP = Final Course Percentage
*$p < .05$

Pressage Var (Teacher)

Context Var. (Learner)

Cumulative grade point average and high school class rank accounted for 65% of the variance in student performance in the introductory agricultural economics course. Learning style (GEFT score) and ACT composite score did not enter into the regression equation; therefore, did not explain a significant portion of the variance in student performance in the course. Based on these results, the conclusion can be drawn that the course instructor was meeting the diverse learning needs of students in the introductory agricultural economics course.

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A Critique By:
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Predictors of Student Achievement in an Introductory Agricultural Economics Course

The purposes of this study were to determine if the instructor of an introductory agricultural economics course was meeting the diverse needs of students enrolled in the course and to identify factors which most accurately predicted student success in the course as measured by final course percentage. The specific objectives of the study were appropriate, however this writer questions how one can explain the unique variance in student achievement accounted for by learning style when learning style and/or prior knowledge and skills were used as one combined variable rather than separated into two independent variables. This study did build upon a body of knowledge accumulated from several related studies.

An ex-post facto correlational study was conducted using a nonprobability (purposive) sample. While the study's authors attempted to evaluate the degree of bias present in the sample, I would be extremely cautious about generalizing beyond the sample. Since this was a nonprobability sample, this author questions why hypothesis testing was used with many of the statistics since a rather important assumption for the use of inferential statistics is a probability sample. While sometimes more difficult and time consuming, this study could have been strengthened by the use of a quasi-experimental design.

The authors used the Group Embedded Figures Test (GEFT) as a measure of learning style. They used previously established validity for the instrument and appropriately established the reliability of the instrument with individuals involved in the study. A question I would raise is why with a timed test did the authors estimate reliability using the split-half Spearman Brown formula for assessing internal consistency? Use of this formula has the potential for artificially inflating the reliability estimate. Once an examinee runs out of time, performance of all remaining uncompleted odd- and even-numbered items will be perfectly consistent, regardless of whether the items are homogeneous in content. A more appropriate method would have been the test-retest method for estimating reliability. This study did not use a neutral category of learning style only field- dependent or independent categories. What does the literature show about this?

Appropriate data analysis was used with this study, however why do the authors talk about an a priori level when they are dealing with a purposive sample? Hypothesis testing is inappropriate with nonprobability samples. This writer would also like to raise some questions relative to the statistics presented in the results section. It would appear the distribution of GEFT scores was skewed, but no statistics giving the reader an indication of the amount of skewness was presented. This writer also wonders why significance tests were used with the correlation coefficients since a nonprobability sample was used. The concerns expressed relative to multicollinearity are appropriate, but the use of bivariate correlation coefficients is not a good way to assess this problem. Tolerance and/or Variance Inflation Factor scores would have helped to assess if this were a problem. Lack of information relative to residual analysis made it impossible to determine if violations of the assumptions for regression analysis were present. Partial regression coefficients would also have helped to assess the unique variance explained by each of the independent variables. It would also appear that an ordinal variable was directly entered into the regression equation rather than being dummy coded which could have influenced the results.

The Relationship Between Learning Styles, and Student Achievement in an Introductory Animal Science Course

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Introduction

An issue facing teachers of agriculture in higher education is providing quality instruction that meets the learning needs of students. Schroeder (1993) concluded that students are coming to institutions of higher learning with more diversity in their learning styles than ever before. Anderson and Adams (1992) indicated more attention than ever was needed to meet the challenge of this increasing diversity. Anderson and Adams further stated that:

One of the most significant challenges that university instructors face is to be tolerant and perceptive enough to recognize learning differences among students. Many instructors do not realize that students vary in the way they process and understand information. The notion that students' cognitive [learning] skills are identical at the college level [suggests] arrogance and elitism by sanctioning one groups' style of learning while discrediting the style of others (p.19).

In investigating the complex phenomenon of teaching and learning, Dunkin and Biddle (1974) suggested that the creation of a model was necessary in developing a theoretical underpinning. Cruickshank (1990) supported the development of theoretical models by stating that they were needed in the study of teaching and learning to capture the complex interactions that occur.

Dunkin and Biddle, (1974) presented a model, based on the original work of Mitzel (1960), to guide the study of teaching and learning. In their model, Dunkin and Biddle suggested that the study of teaching and learning involved four major variable types: presage, context, process, and product (Figure 1). Presage variables include those that influence teachers and their teaching behaviors. Context variables are those that involve the background of the learners, including their personality traits and learning styles. Process variables describe the interaction of teacher and learner behaviors in the teaching-learning process. Finally, product variables include the knowledge and skills gained or attitudes modified as a result of the teaching and learning.

The learning styles of students, a context variable, have been found to influence the educational process and students[] opportunity to learn (Schroeder, 1993; Claxton & Murrell, 1987). Researchers (Witkin, 1973; Gregorc, 1979; Garger & Guild, 1984; Witkin, Moore, Goodenough, & Cox, 1977) have suggested that learning style was influential in students' academic achievement, how students learn, student and teacher interaction and in students' academic choices. Schroeder (1993) acknowledged that accommodating variations in learning styles could improve curricula and the teaching-learning process in higher education.

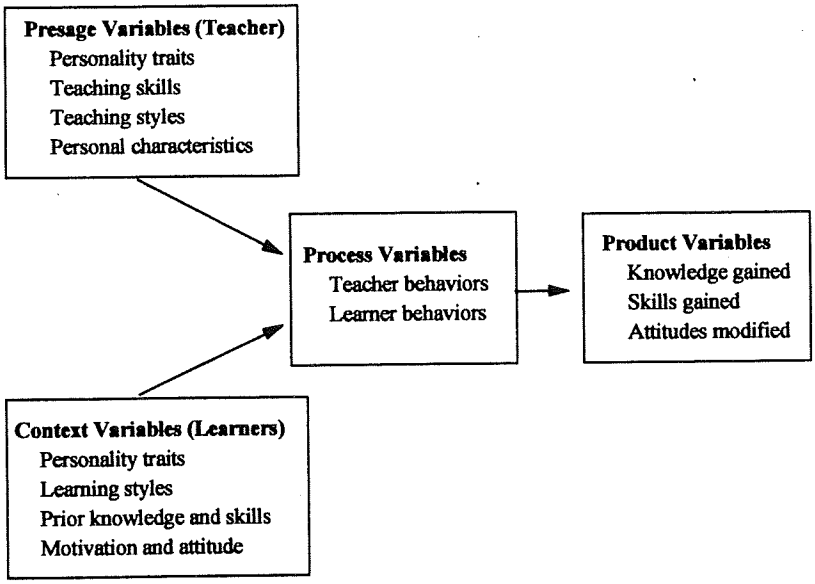

Figure 1. Conceptual Framework

Gregorc (1979) described a person's learning style as consisting of distinct behaviors which serve as indicators of how a person learns and adapts to his/her learning environment. Others (Dunn & Dunn, 1979; Garger & Guild, 1984) have defined learning style as the educational conditions under which an individual is most likely to learn. Witkin (1973) indicated that a learning style influences a student's preference for particular teaching strategies and learning environments. Therefore, learning style describes how a student learns, not how much he/she learned.

The most extensively researched and applied learning style dimension in the past 50 years has been field-dependence/independence (Kogan,1971; Guild & Garger, 1985). Chickering (1976) noted that the field-dependence/independence dimension had major implications for college admissions requirements and for faculty who make decisions about learning environments and practices. In the field-dependence/independence learning style dimension, a person can be categorized as preferring a field-dependent, field-independent, or neutral (possessing characteristics of both field-dependent and field-independent) learning style.

Individuals who prefer a field-dependent learning style tend to perceive globally, have a more difficult time solving problems, are more attuned to their social environment, learn better when concepts are humanized, and tend to favor a "spectator approach" to learning. Additionally, individuals preferring a field-dependent learning style have been found to be more extrinsically motivated and learn better when organization and structure is provided by the teacher (Witkin et al., 1977).

Conversely, individuals who prefer a field-independent learning style tend to view concepts more analytically, therefore finding it easier to solve problems. Individuals preferring a field-independent learning style are more likely to favor learning activities that require individual effort and study. In addition, field-independent learners prefer to develop their own structure and organization for learning, are intrinsically motivated, and are less receptive to social reinforcement. (Witkin et al., 1977).

Research has been conducted to assess the preferred learning style of university students (Anderson & Adams, 1992; Torres & Cano, 1994) and the interaction of teaching approach and learning style on student achievement (Honeyman & Miller, 1998). Additional studies have suggested that students' learning style influences their

cumulative grade point average (Torres, 1993; Torres & Cano, 1994). Cano and Porter (1997) reported that students preferring a field-independent learning style were more successful in higher education. The previously identified research has focused on describing how different groups of students learn and their academic performance based on grade point average. What has been lacking is research that focuses on the knowledge and skills learned in an individual course and the factors that influence students' achievement in that course.

Purpose and Objectives

The purpose of this study was to identify relationships that existed between learning style, a context variable, teaching performance, a process variable, and student achievement, a product variable, in an introductory animal science course. The specific objectives of the study were to:

- Describe the preferred learning style of students.
- Describe the relationship between students' preferred learning style and the instructors' teaching performance as perceived by students.
- Describe the relationship between students' preferred learning style and their achievement in the course.
- Explain the variance in student achievement accounted for by learning style and/or prior knowledge and skills, as assessed by university admissions criteria.

Procedures

Population and Sample

The target population for this ex-post facto correlational study consisted of students majoring in Animal Science at the University of Missouri. A purposive sample of an intact group of students enrolled in "Animal Science," an introductory course, was selected (n=187). The introductory course is required of all animal science majors and is usually taken during their first semester of college enrollment.

Nonprobability sampling was used based upon the context of the study (Grosof & Sardy, 1985; Judd, Smith, & Kidder, 1991; Gay, 1996; Greenfield, 1996). To assist in affirming nonbias sampling, a comparison of university admissions criteria, including high school class rank and ACT scores, was used to determine that the characteristics of the sample appropriately reflected the target population.

Instrumentation

The Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin & Karp, 1971) was administered to assess the preferred learning style of students. The total possible range of scores on the GEFT was 0 to 18. The national mean on the GEFT is 11.4. Individuals scoring 14 or greater were considered to prefer a field-independent learning style, individuals scoring 10 or less were considered to prefer a field-dependent learning style, and those individuals scoring from 11 to 13 were considered to prefer a neutral learning style.

The GEFT is a standardized instrument that has been used in educational research for over 25 years (Guild & Garger, 1985). The validity and reliability of the GEFT was established by the instrument's developers (Witkin, Oltman, Raskin, & Karp, 1971). The validity of the GEFT was established by determining its relationship with the parent test, Embedded Figures Test (EFT), as well as the Rod and Frame Test (RFT), and the Body Adjustment Test (BAT) (Witkin et al, 1971). The GEFT is a timed test, therefore internal consistency was measured by treating each section as split-halves (Spearman-Brown reliability coefficient of .82).

Analysis of Data

The GEFT was administered to all students enrolled in the introductory animal science course during the second class session. Four instructors, with GEFT scores ranging from 6 to 18, taught the course. Students rated the instructors' teaching performance at the conclusion of each instructor's portion of the 16 week course using a standard university instructor evaluation.

Descriptive statistics were calculated on GEFT scores, university admissions variables (ACT English, ACT mathematics, ACT reading, ACT science, ACT composite, and high school class rank), university instructor evaluations, and student achievement as measured by scores on exams. Pearson product-moment correlation coefficients were calculated between the variables of interest and were interpreted utilizing Davis' (1971) descriptors. Stepwise regression analysis was used to explain variance in student achievement accounted for by learning style and prior knowledge and skills, as assessed by university admissions criteria.

Results

An analysis of the learning styles of students enrolled in the introductory animal science course indicated that a majority (56%) preferred a field-independent learning style (Table 1). The remaining students were split equally between a neutral (22%) and a field-dependent (22%) learning style. The mean GEFT score was 13.4 with a standard deviation of 3.8.

Table 1.Preferred Learning Style by Gender (n=187)

	Field-Dependent		Neutral		Field-Independent		GEFT	
	n	%	n	%	n	%	Mean	SD
Males (n=77)	21	27.3	13	16.9	43	55.8	13.2	3.93
Females (n=110)	20	18.2	28	25.5	62	56.3	13.5	3.78
Total	41	21.9	41	21.9	105	56.2	13.4	3.84

A break down of learning styles by gender revealed that a majority (56%) of both male and female students preferred a field-independent learning style. An analysis of the opposite end of the continuum revealed that 27% of the males, but only 18% of the females, preferred a field-dependent learning style. The remaining students, 17% of the males and 26% of the females, fell in the middle of the continuum and therefore were classified as neutral. The mean GEFT score for males was 13.2 (SD = 3.9) and females 13.5 (SD = 3.8).

The second objective sought to describe relationships between students' preferred learning style, using GEFT scores, and the teaching performance of each of the four instructors, as perceived by students on instructor evaluations. Relationships ranged from a -.08 for instructor one on "the organization of the subject matter" to a .21 for instructor four on "knowledge of the subject matter" (Table 2). However, only one coefficient across all four instructors was found to be significant at the .05 alpha level. The item "examinations contributed to my learning" for instructor one was found to have a low positive relationship with students' GEFT scores.

Low positive and significant relationships were found between students' preferred learning style, using GEFT scores, and student achievement on examinations when taught by the first instructor (r = .16) and the fourth instructor (r = .19) of the introductory animal science course (Table 3). Students' overall achievement in the course was found to have a low positive and significant relationship (r = .14) with their preferred way of learning.

Table 2: Relationship Between Learning Style and Teaching Performance as Perceived by Students

Teachers Performance Assessment Item[a]	Instructor 1 Mean (SD)	r	Instructor 2 Mean (SD)	r	Instructor 3 Mean (SD)	r	Instructor 4 Mean (SD)	r
1. The instructor's organization of the subject matter made it easy to follow.	4.12 (.65)	-.08	4.48 (.68)	.06	3.69 (.89)	-.02	3.94 (.83)	.14
2. The instructor's explanations were easy to understand.	3.82 (.83)	.02	4.50 (.68)	.07	3.51 (.92)	-.05	3.92 (.76)	.20
3. The instructor's voice was clear and easy to understand.	3.75 (.98)	.06	4.88 (.35)	.03	4.08 (.81)	.00	4.13 (.74)	-.05
4. The instructor's ability to present alternative explanations was effective.	3.67 (.80)	-.02	4.31 (.75)	.07	3.68 (.93)	-.01	3.93 (.79)	.05
5. The instructor's use of examples and illustrations were helpful.	3.94 (.79)	.04	4.23 (.79)	.07	3.97 (.84)	-.04	4.00 (.74)	.09
6. The instructor was enthusiastic (excited) about teaching.	3.78 (.89)	-.03	4.94 (.37)	.03	3.71 (.84)	.01	3.71 (.83)	.02
7. The learning (course) objectives were clearly communicated.	3.95 (.84)	.03	4.59 (.66)	.09	3.64 (.93)	.04	3.93 (.88)	.10
8. The instructor was available when extra help was needed.	3.29 (.68)	.07	4.01 (.82)	.09	3.33 (.68)	.02	3.60 (.73)	.15
9. The instructor was very knowledgeable of the subject matter.	4.53 (.54)	-.07	4.74 (.44)	.05	4.48 (.59)	.03	4.40 (.57)	.21
10. The assignments were helpful in learning the course content.	3.22 (.82)	-.04	4.35 (.79)	.04	3.69 (.80)	.10	3.83 (.86)	.01
11. The instructor provided feedback regarding my learning.	3.34 (.88)	.01	4.09 (.84)	.07	3.38 (.84)	-.06	3.60 (.83)	.02
12. The instructor's examinations contributed to my learning.	3.78 (1.0)	.15*	4.15 (.93)	.08	3.83 (.80)	.02	3.72 (.83)	.04
13. How would you rate the overall teaching effectiveness?[b]	3.66 (.82)	.12	4.68 (.55)	.05	3.55 (.79)	.06	3.76 (.81)	.10

[a]Scale: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree
[b]Scale: 5 = excellent, 4 = quite good, 3 = satisfactory, 2 = fair, 1 = poor
*$p < .05$

Table 3: Relationship Between Learning Style and Student Achievement by Instructor

Variable	X_1	X_2	X_3	X_4	X_5	X_6
Learning Style (GEFT) (X_1)	1.0	.16*	.11	.07	.19*	.14*
First instructor's exam (X_2)		1.0	.40*	.50*	.52*	.73*
Second instructor's exam (X_3)			1.0	.52*	.65*	.78*
Third instructor's exam (X_4)				1.0	.64*	.82*
Fourth instructor's exam (X_5)					1.0	.82*
Total course percentage (X_6)						1.0

*$p < .05$.

A correlation matrix was generated to show the intercorrelations of variables regressed on student achievement, as measured by final course percentage (Table 4). Variables regressed on student achievement ranged from a substantial negative and significant relationship ($r = -.55$) for advising group to a low positive and significant relationship ($r = .14$) for learning style. In addition, prior experience with animals was found to have a negligible and non-significant relationship ($r = -.02$) with student achievement in the introductory animal science course.

The correlation matrix was also used to reveal the presence of multicollinearity, a potential violation of the assumptions in using multiple linear regression. Using guidelines offered by Lewis-Beck (1980) to combat multicollinearity, bivariate correlations near .8 are potential threats and should be removed prior to conducting regression analysis. ACT was excluded from consideration in the regression equation because of its very strong relationship with ACT math ($r = .79$), ACT reading ($r = .85$), ACT science ($r = .85$), and advising group ($r = -.77$). Furthermore, high school class rank was excluded from the regression equation because of its very strong relationship with advising group ($r = -.88$).

Stepwise multiple regression was used to explain the variance in student achievement accounted for by learning style and/or prior knowledge and skills, as assessed by university admissions criteria. Thirty three percent of the variance in student achievement in the introductory animal science course could be explained by a linear combination of advising group status and ACT math scores (Table 5). Variables not entering the regression equation included: learning style (GEFT), ACT English, ACT reading, ACT science, and prior experience with animals.

Table 4: Intercorrelations of Variables Regressed on Student Achievement

	Intercorrelations									
Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
GEFT (X_1)	1.0	.34*	.10	.35*	.22*	.26*	.15	-.27*	-.10	.14*
ACT (X_2)		1.0	.23*	.79*	.85*	.85*	.54*	-.77*	-.08	.51*
ACT English (X_3)			1.0	.22*	.20*	.11	.21*	-.19*	.04	.17*
ACT math (X_4)				1.0	.47*	.67*	.51*	-.65*	-.08	.46*
ACT reading (X_5)					1.0	.62*	.35*	-.59*	-.12	.41*
ACT science (X_6)						1.0	.50*	-.70*	-.16	.42*
High school rank (X_7)							1.0	-.88*	-.01	.43*
Advising group (X_8)[a]								1.0	.10	-.55*
Experience (X_9)[b]									1.0	-.02
Achievement[c] (Y)										1.0

[a]Advising group = 1, 2, 3, or 4; based on high school class rank, ACT score, and grade point average in core high school courses
[b]0 = no experience with animals, 1 = some experience with animals, 3 = raised animals; [c]Achievement = final course percentage; *$p < .05$

Table 5: Stepwise Regression of Achievement in Course on Variables of Interest[a]

Variable	B	SE B	β	t
Advising group	-3.68	.78	-.42	-4.7*
ACT math	.42	.19	.19	2.2*

Note. $R^2 = .33$, *$p < .05$

[a]GEFT, ACT English, ACT math, ACT reading, ACT science, advising group, experience with animals

Conclusions, Implications and Recommendations

A majority of the students enrolled in the introductory animal science course preferred a field-independent learning style. This finding was consistent with previous research which found that a majority of college agriculture students preferred a field-independent learning style (Torres & Cano, 1994; Cano & Porter, 1997). The students mean GEFT score was 13.4 which was two points above the established norm of 11.4 (Witkin, et al., 1977). However, the mean GEFT score of 13.4 approximated the GEFT score of animal science majors at other higher education institutions (Torres & Cano, 1994).

Both male and female students enrolled in the introductory animal science course preferred a field-independent learning style. A slightly higher percentage of females than males preferred a field-independent learning style. This finding is not consistent with previous research. Torres and Cano (1994) reported that a majority of female agriculture students preferred a field-dependent learning style where in the current study only 18% of the females preferred a field-dependent learning style. Furthermore, the findings of the current study contrasts previous research (Garger & Guild, 1984; Witkin, et al., 1977; Claxton & Murrell, 1987) that found persistent gender differences in the field-dependence/independence dimension with females preferring a field-dependent learning style. Consequently, could the difference in preferred learning style have an impact on the teaching performance of the four instructors?

There was no practical relationship between students' learning style and the four instructors' teaching performance, as perceived by students. This would imply that the instructors' teaching performance was not associated with learning style and, as viewed by students, the instructors were reaching their diverse learning needs.

A low positive relationship was found between students' learning style and their achievement in the course. Furthermore, low positive relationships were found between learning style and achievement in the section of the course taught by the first and fourth instructors. Although the relationships were low, they were in the positive direction, indicating that as students moved toward a field-independent learning style their achievement in the course increased.

Advising group status and ACT math score accounted for 33% of the variance in student achievement. A negative correlation coefficient for advising group status implied that as a student's advising group status moved toward advising group four, achievement in the course was lessened. Conversely, a positive correlation coefficient for ACT math implied that as ACT math score increased, achievement in the course increased. Interestingly, learning style and students' prior experience with animals did not explain a significant proportion of the variance above and beyond that explained by advising group and ACT math. Therefore, the conclusion can be made that the instructors of the course were meeting the diverse learning needs of students.

Possessing the knowledge that advising group status plays a crucial part in student achievement has implications for the instructors of the course. Information indicating a student's advising group is readily available to advisors and course instructors. Students falling into advising groups three and four should be closely monitored for their learning needs and should be provided regular feedback on their learning progress. Currently, the introductory animal science course meets three times per week in a large lecture class. It is recommended that the instructors consider switching to two lecture periods and have small discussion groups meet for the third period each week. Dividing the course into small discussion groups would allow instructors to more closely monitor students' progress and make it easier to

identify and assist those students falling into advising group three or four status who are in need of learning assistance. It is further recommended that after modifications to the course are made that the instructors re-evaluate the impact that advising group status has on student achievement.

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A Critique By:
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The Relationship Between Learning Styles, Teaching Performance, and Student Achievement in an Introductory Animal Science Course

The purpose of this study was to identify relationships that existed between learning style, teaching performance, and student achievement in an introductory animal science course at the University of Missouri. The specific objectives of the study were appropriate, however this author does wonder how one can explain the unique variance in student achievement accounted for by learning style when learning style and/or prior knowledge and skills were used as one combined variable rather than separated into two independent variables. This study did build upon a body of knowledge accumulated from several related studies.

An ex-post facto correlational study was conducted using a nonprobability (purposive) sample. While the study's authors attempted to evaluate the degree of bias present in the sample, I would be extremely cautious about generalizing beyond the sample. Since this was a nonprobability sample, this author questions why hypothesis testing was used with many of the statistics since a rather important assumption for the use of inferential statistics is a probability sample. While sometimes more difficult and time consuming, this study could have been strengthened by the use of a quasi-experimental design.

The authors used the Group Embedded Figures Test (GEFT) as a measure of learning style. They used previously established validity for the instrument and appropriately established the reliability of the instrument with individuals involved in the study. A question I would raise is why with a timed test did the authors estimate reliability using the split-half Spearman Brown formula for assessing internal consistency? Use of this formula has the potential for artificially inflating the reliability estimate. Once an examinee runs out of time, performance on all remaining uncompleted odd- and even-numbered items will be perfectly consistent, regardless of whether the items are homogeneous in content. A more appropriate method would have been the test-retest method for estimating reliability. Another question, does the literature support a neutral category of learning style?

Appropriate data analysis was used with this study, however, I would like to raise some questions relative to the statistics presented in the results section. It would appear the distribution of GEFT scores was skewed but no statistics giving the reader any indication of the amount of skewness was presented. This writer also wonders why significance tests were used with the correlation coefficients since a nonprobability sample was used. The concerns expressed relative to multicollinearity are appropriate, but the use of bivariate correlation coefficients is not a good way to assess this problem. Tolerance and/or Variance Inflation Factor scores would have helped to assess if this were a problem. Lack of information relative to residual analysis made it impossible to determine if violations of the assumptions for regression analysis were present. Partial regression coefficients would also have helped to assess the unique variance explained by each of the independent variables. It would also appear that a nominal variable was directly entered into the regression equation rather than being dummy coded which could have influenced the results.

In summary, this is an important topic for study and appropriate methods were used. Some extra attention to detail could have produced a more valid study.

Educational Experiences and Academic Achievement of Rural, Suburban, and Urban Students

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Introduction/Theoretical Framework

Do students in rural schools receive the same education as students in suburban and urban schools? This question has been asked for more than eighty years. In a 1914 book Better Rural Schools, the following question was posed. "The rural school must be able to offer the farm child as good an education as that available to the town or city child, though this education will of necessity be in part a different education. Can the rural schools as they average over our country now measure up to the new requirements being placed on them?" (Betts and Hall, 1914, pp. 6-7).

It is apparent to nearly everyone that our society and population demographics have changed greatly since the settlement of the colonies to the present day. Our society which was "agriculturally" based has evolved into and through the "manufacturing" stage. During this "manufacturing" stage society witnessed the age of mechanization which increased production and efficiency in agriculture. One of the results of this new found efficiency of agriculture production was a migration of people from rural areas to the cities and into the factories of the manufacturing industry. This initiated the trend that rural America finds itself in currently. The trend is young people from rural areas moving to the city in search of better jobs. The effect of this migration on the educational system was pointed out by Sher and Tompkins, (1977). They reported there were approximately 128,000 school districts in the United States in 1930. By 1995 the number had dropped to 16,429 according to the National Center for Educational Statistics (1995). Sher and Tompkins also pointed out that the demise of over 100,000 school districts was also the demise of the same number of local governments. More was lost from the community than just the school itself. Declining enrollment, limited resources, and the task to provide a well-rounded education described the challenges facing rural school districts. Agricultural education programs are often located in rural school districts and are affected by the same social and demographic changes.

With global competition affecting manufactured goods and a dismal decade during the 1980's for economic growth, the "manufacturing society" began to concede its predominance, as the "agricultural society" had to it. During the transition from the "manufacturing society" to the "information society," the rural manufacturing-based economy became depleted. The rise of rural manufacturing plants which flourished under the conditions of rural, nonunion, and low pay accepting laborers, began to decline. Rural factories were closed in favor of the city factories that were closer to corporate headquarters and a labor supply. Rural communities, which extended themselves and their city services in return for jobs and a stable economic base other than

agriculture, found themselves in economic disarray. Coinciding with the loss of the manufacturing economy was a weakened agricultural economy. Penson, Capps, and Rosson, (1996) discussed in their textbook Introduction to Agricultural Economics, that many rural communities were under severe financial stress during the 1980s when farmers and ranchers experienced declining incomes and property values. Faced with high employment and less tax revenue, the cost of education appeared to loom even larger. School districts, which relied on a tax base for funding now, had even fewer funds. A study by Knutson and Fisher, (1989) identified the leading rural development issues. Their study found that one of the most frequently cited rural development issues was the enhancement of educational opportunities. Their study also identified economic opportunities as a major concern for rural development. Stuart Rosenfeld, (1983) raised the question, "What can education do to help rebuild rural economies?" His answer was not school consolidation that can result in a rural community devoid of the community infrastructure a school can provide. He favored school centered economic ventures that would be modeled after vocational agriculture and its methods to build entrepreneurial skills in students.

The current societal stage places great emphasis on the acquisition of information and the transferring of information from one source to another around the globe. Technological advancements in the area of computers, fax machines, and satellite transmission have made it easy and more affordable to disseminate and receive information worldwide. The information network allows the browser the opportunity to peruse and select the information he/she deems valuable. It is the ever-demanding task of our nation's educational system to prepare students for the information society and for them to be prepared for what may yet come as the society continues to change.

The public often asks the educational system to perform the previous mentioned task with too little resources, inadequate training, and with technology that is outdated. This places a great burden on the schools that are already resource poor or deficient. Some players in the educational reform movement foresee this as the rural schools' final breaking point. Nathan Weate, (1992) pointed out the double edge sword of current educational reform. One cutting edge of the reform sword wants stronger academics and particularly in larger schools with the resources to do it efficiently. The other side of the cutting edge of reform is that the academics must be taught by stressing the quality of life to teach the academic subjects more effectively. What is the optimum sized school to accomplish this difficult task?

An obvious question to ask is, "can our nation's schools provide students with educational opportunities which will allow them to fulfill a productive role in this changing society and have the ability to change with it?" This question may be asked specifically of schools in rural settings. Can an educational institution, which is separated from the forefront of change by physical distance, technology, and lack of opportunities, produce students that equal their urban and suburban counterparts in scholastic achievement? Gary Green and Wanda Stevens, (1988) concluded that there are many factors which must be taken into consideration when evaluating the effectiveness of a school. They warrant that school size in itself does not necessarily mean lower academic achievement.

Secondly, can the same rural educational institutions offer to their students the curricular choices that they may need to be productive in our "information society"? Jonathan Sher, (1983) cautioned against the generalizations of rural schools and their educational potential. He stated that "diversity is the norm" when considering the quality of education that can be provided by a rural school. To lump all rural schools into a single category would be a serious mistake.

Can a resource-deficient school provide an educational environment that fosters and promotes academic achievement, personal growth, and a sense of values that will allow the student to secure a productive and positive role in society? Proponents of school consolidation make the case that the lack of district resources is a major reason for consolidation. Everett Edington and Helena Martellaro, (1988) pointed out that academic achievement is not the driving force behind school consolidation, rather it is the economics. Per pupil cost is considered to be more important than student achievement. Faith Dunne, (1983) stated that local schools are vitally important to the self image of many rural communities, but these schools often become the ground for last ditch battles between the "locals" and the "experts". Dunne also raised the questions, "What are the benefits and drawbacks of local control?" "Who does have the final authority in the control of a school?" These are questions educators, educational reform proponents and opponents should ask themselves as they plan and propose educational change for the students of the 21st century.

Purpose/Objectives

The purpose of this study was derived from the points brought out previously in the text by the researcher and other educators. The purpose of the study was to determine if students in rural areas (schools) are educationally disadvantaged in comparison to students who attend school in urban and suburban areas. Educationally disadvantaged was defined by the researcher as 1) fewer academic courses taken, 2) less enrichment activities (extra- and intra-curricular activities, and 3) lower academic achievement. The objectives were:

1. To describe and compare the academic courses taken by students.
2. To describe and compare student participation in team sports, academic clubs, and vocational clubs.
3. To determine and compare the academic achievement, as measured by cognitive tests, of students.

The research questions for the study parallel the study's objectives. The first question to be answered by this study is: "Does a difference in course taking patterns and participation in school related activities exist between students educated in a rural school setting and those who are not (urban and suburban)?" Secondly, is there a difference in academic achievement among rural, urban, and suburban students?

Methods/Procedures

The data for this study came from the National Educational Longitudinal Study of 1988, (NELS:88). This public use data set was obtained from the National Center for Educational Statistics in Washington, D.C. As the name of the data set indicates this was a longitudinal study

beginning with the base year of 1988, with subsequent follow-ups every two years through 1994. It is the base year and the first two follow-ups which are of the most interest to this study. The data set provides information about eighth-graders, sophomores, and seniors in high school.

The NELS:88 design allows the researcher to conduct statistical analyses on three principle levels: cross-wave, cross-sectional at a single point in time, and cross-cohort by comparing NELS:88 findings to those of previous longitudinal studies. The base year study design was made up of four components: descriptive surveys and achievement tests of students, and descriptive surveys of parents, school administrators, and teachers. In the NELS:88 base year, a two-stage stratified probability design was used to select a nationally representative sample of eighth-grade schools and students. Schools constituted the primary sampling unit; the target sample size for schools was 1,032. A pool of 1,032 schools was selected through stratified sampling with probability of selection proportional to eighth-grade size. A pool of replacement schools was selected by the same procedure. Of the 1,032 schools selected, 698 participated. An additional 359 schools from the replacement pool were selected and participated for a total school sample size of 1,057.

The second stage-sampling unit was the student. The second stage student sampling produced a random selection of 26,432 eighth-graders from the participating schools. The number participating in the study was 24,599, which equals an average of 23 students participating per participating school.

The first follow-up of the NELS:88 consisted of the same components as the base year study. One exception to this was the exclusion of the parent survey because it was not conducted in 1990. Also, three new components were added in addition to the base year components. The three new components to the study were the dropout study, base year intelligible study, and the school effectiveness study. To provide a representative cross-sectional sample of sophomores, the student sample was freshened with 1,043 sophomores who were not in the base year study. These students were given an additional supplemental survey to gather basic demographic information which was asked for in the base year but not in the first follow-up. Those students retained from the base year study, (21,474) and the freshened sample provided a sample size of 22,517 students.

The NELS:88 second follow-up, conducted in 1992, repeated all components of the first follow-up study. The parent survey was included in this follow-up once again and two other new components were added. Transcript and course offerings components were implemented into the second follow-up study. Students were asked to complete a questionnaire and to take achievement tests as they had in the base year and the first follow-up as well. Parents, teachers, and school administrators also completed a questionnaire concerning various aspects of the educational process and decision making. Each student who responded in the first follow-up was also selected for the second follow-up. An additional 243 twelfth-graders were added to freshen the sample and to provide for an adequate cross-second of high school seniors. A student new to the study completed a supplement questionnaire that provided information that was asked for in the base year. Rates of completion of the data instruments for the base year and the follow-ups are found in Table 1.

Table 1: Percent completion rates of instruments during data collection.

Instrument	Base Year	2nd Wave	3rd Wave
Student questionnaire	93.0	94.1	92.5
Student tests	96.3	95.2	78.
Dropout questionnaire	NA	89.8	87.
Dropout tests	NA	50.0	40.
School questionnaire	98.3	97.	97.
Parent questionnaire	92.0	NA	93.
Teacher questionnaire	94.2	87.31	90.7

Results/Findings

Demographic data were collected to describe the sample of students that were in the research study. The first demographic variable provided the distribution of the sample into the three urbanicity categories. The definition of metropolitan status used was the one used by the U.S. Census in 1990. Urban is described as "metropolitan statistical area with a central city containing a population of 50,000 or more", suburban is described as "area surrounding a central city within a county constituting a MSA", and rural is described as "area outside an MSA". As noted in Table 2, 28.3 percent of the sample attended a school located in a rural area. It is important to note that "rural area" includes small cities, towns, and communities. Schools located in the suburban area constituted 36.1 percent of the sample and the remaining 26.9 percent of the sample were enrolled in schools located in urban areas.

Table 2: Frequency distribution for urbanicity of school location.

		Valid	Cumulative
Value	Frequency	Percent	Percent
1-urban	5699	26.9	26.9
2-suburban	7642	36.1	63.0
3-rural	5993	28.3	91.2
8-missing	1854	8.8	100.00

To describe the type of educational programs the respondents have undertaken in their respective high schools, a variable for program track was selected. The variable representing the school program the student was in was configured from the courses listed on the student's transcript. There were six possible responses which could have resulted from the information on the student's transcript. First was rigorous academic track. Secondly, was academic track followed by the third possibility which was vocational track. The fourth possibility was vocational/rigorous academic. Possibility number five was academic/vocational and the sixth possible response was none of the above.

A crosstabs frequency analysis was conducted to the program track variable and urbanicity variable to determine the number and percentages of the respondents across the possible combinations of high school program and locality of the high school. A Chi square statistic (.05 level of

significance) was also calculated to determine if the resulting frequency distribution was equally distributed across the categories. Author Marija Norris, (1988) states in the SPSS-X Introductory Statistics Guide that two variables are by definition independent if the probability that a case falls into a given cell is simply the product of the marginal probabilities of the two categories defining the cell. An adjusted residual was calculated for each cell and any cell, which had an adjusted residual value of, two or more is considered a contributor to the significant Chi square statistic.

The results of the crosstabs analysis are shown in Table 3. A significant Chi square was found indicating that there was a difference in the frequency distribution for program track among urban, suburban, and rural student groups. Urban students and to a lesser extent, suburban students, were more likely to be enrolled in rigorous academic and academic tracks when compared to rural students. Of the students enrolled in urban schools, 19.4 percent showed a rigorous academic program track, while 50.2 percent were enrolled in an academic track. Only 3.7 percent of the urban students were in a vocational track and 8 and 4.4 percent were in the vocational/rigorous track and academic/vocational track respectively.

Table 3: Distribution (percentages) of program tracks by urbanicity.

		Program Track					
Urbanicity		1	2	3	4	5	6
Urban	1	**19.4**	**50.2**	3.7	.8	4.4	21.5
Suburban	2	**19.3**	47.7	5.5	.6	6.1	20.8
Rural	3	15.7	44.3	7.8	.8	8.5	**22.9**
Missing	8	.7	10.1	4.2		.7	**84.3**

1=rigorous academic, 2=academic, 3=vocational, 4=rigorous academic/vocational
5=academic/vocational, 6=none of the above
*bolded values indicate cells that contributed to the significant Chi square statistic

Of the students enrolled in suburban schools, 19.3 percent showed a rigorous academic program track, while 46.7 percent were enrolled in an academic track. Only 5.5 percent of the suburban students were in a vocational track and .6 and 6.1 percent were in the vocational/rigorous track and academic/vocational track respectively. Of the students enrolled in rural schools, 15.7 percent showed a rigorous academic program track, while 44.3 percent were enrolled in an academic track. Only 7.8 percent of the rural students were in a vocational track and .8 and 8.5 percent were in the vocational/rigorous track and academic/vocational track respectively.

A second aspect of the first research objective was to determine the number of courses taken by the sample of students of the research study. Comparisons between the urbanicity of the schools where the students were enrolled were made of the number of courses taken by the students. The mean number of Carnegie units taken by the student of the different courses was the variable utilized for this analysis. A one-way analysis of variance (.05 level of significance) was performed to determine if one group's mean number of units was different from the mean of another group. The groups were urban, suburban, and rural. If the group means were found to be different, then a Scheffe' test (.05 level of significance) was performed to determine between what groups the

difference existed. The summary of the one-way analysis of variance procedures is shown in Table 4.

Table 4: Analysis of variance results for mean Carnegie units taken by urbanicity of respondents.

Course	Urban mean	Suburban mean	Rural mean	F Ratio	F Prob
Math	3.04	2.89	2.84	39.86	.00
Science	2.74	2.79	2.64	23.35	.00
English	3.74	3.73	3.70	1.34	.26
Social Studies	3.14	3.24	3.08	29.05	.00
Computer Science	0.39	0.35	0.42	24.53	.00
Foreign Language	1.97	1.80	1.23	36.73	.00

There were significant differences in the mean number of Carnegie math, science, social studies, computer science and foreign language units taken by grade 12 students. The Scheffe' test was used to locate the differences. Urban and suburban students took significantly more math, science, social studies, and foreign language units than rural students did. There was no difference with respect to the number of English units. Interestingly, rural students had taken more units in computer science.

The second objective of the study was to describe and compare student participation in team sports, academic clubs, and vocational clubs. As can be seen in Table 5, slightly more urban students reported "no participation" in team sports and slightly more rural students were more likely to on a varsity team and be a team leader. The "does not have" category refers to the student's opinion that the school does not have a team sport in the student's interest area.

Table 5: Student participation (percentages) in team sports by urbanicity.

Urbanicity	Team Sport					
	Does not Have	No participation	Junior Varsity	Varsity	Team Leader	Missing
Urban	1.7	63.2	2.5	14.8	9.0	8.8
Suburban	1.7	**60.2***	2.5	16.5	10.3	8.9
Rural	1.1	**62.3**	**2.1**	**16.6**	**11.5**	6.3

*bolded values indicate cells which contributed to the significant Chi square statistic

Student participation in academic clubs is presented in Table 6. On the whole, rates of participation were similar among the three groups. Slightly more rural students reported that there were no academic clubs available to them and the rate of participation was also slightly higher. Suburban students reported the greatest rate of non-participation.

Table 6: Student participation (percentages) in academic clubs by urbanicity.

Urbanicity	Does not have	No participation	Participate	Club Leader	Missing
Urban	3.6	**63.7**	19.5	4.9	8.3
Suburban	4.0	**64.1**	19.4	3.9	8.5
Rural	**6.3**	**63.5**	**20.4**	4.0	5.9

*bolded values indicate cells that contributed to the significant Chi square statistic

Student participation in vocational clubs is shown in Table 7. Fewer rural students reported no vocational clubs in their interest area when compared to suburban and urban students. In addition, the participation rate was higher for rural students.

Table 7: Student participation (percentages) in vocational clubs by urbanicity.

Urbanicity	Does not have	No participation	Participate	Club Leader	Missing
Urban	15.8	**65.4**	8.0	2.4	8.3
Suburban	11.1	**68.1**	8.9	3.4	8.5
Rural	**5.8**	62.4	**18.4**	7.4	5.9

*bolded values indicate cells which contributed to the significant Chi square statistic

The third research objective of this study was to determine if there was a difference in academic achievement among rural, urban, and suburban students. To determine if a difference in academic achievement existed the researcher selected variable from the sample data which corresponded to academic achievement scores on cognitive tests. The scores on the cognitive tests were also used to determine the proficiency level of the respondent in the areas of math, reading, science, and history/citizenship/geography.

The results of the frequency distributions for the different proficiency levels of math, science, and reading, indicated the wide range of cognitive ability existed among the students in the schools studied. To accurately and adequately measure the achievement of the students and to compare the achievement of the students in groups against one another, a standardized test score was utilized. The student's raw score on the cognitive ability test was converted to a standardized score with a mean of 50 and the standard deviation of 10. The cognitive testing which took place during the second follow-up used tests which were of a different level of difficulty. The test the respondent received was based on their cognitive test performance during the base year when the student was in eighth-grade.

The variable used as the measurement of cognitive ability and compared across groups of students was the standard score for mathematics, science, reading comprehension, and history/citizenship/geography tests. The reliability coefficients of the student score from the cognitive tests were .85 for reading, .94 for math, .82 for science, and .85 for history/citizenship/geography. The grouping variable was the variable urbanicity which divided the study's sample into urban, suburban, and rural subsets. The results of the one-way analysis of variance procedure for the cognitive test achievement comparisons are shown in Table 8.

Table 8: Analysis of variance results for standardized student achievement scores by urbanicity of respondents.

Course	Urban mean	Suburban mean	Rural mean	F Ratio	F Prob
Math	66.32	66.48	61.42	94.57	.00
Science	65.93	66.47	61.94	69.34	.00
Reading Comprehension	66.19	65.99	61.30	85.61	.00
History/citizenship Geography	66.75	66.59	61.73	90.51	.00

There was a significant difference between the scores of the rural students and both the urban and suburban students on all four measures of student achievement. In all four cases rural students scored significantly lower than the other two groups.

Conclusions/Recommendations/Implications

The data in this study partially support the notion that students attending rural schools may be at a disadvantage when it comes to the availability of advanced course offerings and academic achievement.

1. The results of this study indicate that a surprising large percentage of students live in rural areas (28.3%). Suburban students make up the largest group (36.1%), followed by rural students (28.3%) and then urban students (26.9). This finding is due to the way communities are classified into groups according to urbanicity. For a school to be located in an urban area, it must be within a central city of 50,000 in population or more. Rural areas are all areas outside the central city and not surrounding the central city. Rural areas include many small cities and towns.

2. Urban and suburban students complete a rigorous academic or academic track at a higher rate than rural students do. The rate is 69.6% for urban and 67.0% for suburban students compared to 60.0% for rural students. Rural students complete vocational tracks or combinations of vocational and academic tracks more frequently than suburban or urban students do. The reasons for this difference are not clearly indicated by the data in this study.

3. Because of the large size of the sample, a small difference between group means was determined to be significant. Urban and suburban students take slightly more math, science, social studies, and foreign language units than rural students do. The number of English courses is approximately the same for all three groups. Rural students take slightly more computer science units than the other two groups. Either there are more course offerings available in urban and suburban schools or rural students are not enrolling in these offerings. The most likely explanation is that there are fewer course offerings in rural schools due to their size and staffing levels. Perhaps being smaller is an advantage when it comes to computer science. Perhaps there are fewer students competing for computer science classes or equipment, or rural schools are investing more heavily in computer science classes.

4. There are only minor differences in the offerings and participation in team sports and academic clubs by the three groups. It appears that there are a slightly larger percentage of rural students taking advantage of these extra-curricular activities. Students in rural areas are also participating in vocational clubs to a slightly greater extent than their urban and suburban counterparts. Participation in vocational clubs, such as FFA and FHA, accounted for much of the increased participation rate for rural students.

5. Students in urban and suburban areas score significantly higher in math, science, reading comprehension, and history/citizenship/geography achievement tests. The data in this study do not clearly indicate a reason for this difference. It may be that the increased participation in a rigorous academic track and higher numbers of Carnegie units in math, science, and social studies taken by urban and suburban students that account for some of the differences observed.

Students in rural areas make up almost 30 percent of all students in the United States. There are some important differences in the experiences and performance of students when urbanicity is examined. If rural schools have the goal to be equal to suburban and urban schools, changes must be adopted. Schools must examine their curriculum and curricular tracks and make the necessary changes to more accurately reflect the curriculum in schools located in more urbanized areas. This can be difficult to accomplish considering the fact that many rural schools lack the financial resources to hire additional staff and teach additional courses. It appears that smaller rural schools offer less number of science and math courses than larger schools. The article, "School Size and Program Comprehensiveness", by Emil Haller (1990) showed evidence which supports this conclusion. Approximately 25 percent of small rural schools offer the basic science courses plus two additional elective science courses. However, nearly 75 percent of the larger schools offer the basic science courses plus two additional science electives. The same course offering disparity exists with math courses as well. Since agricultural education is often offered in rural schools, it may be feasible to structure some agriculture or horticulture courses to meet science requirements.

Similar conclusions can be drawn concerning foreign languages. Typically rural schools offer only one foreign language to study. In Haller's study, approximately 25 percent of the smaller schools

offered more than one foreign language. In the larger sized schools of Haller's study, approximately 95 percent of the larger schools offered more than one foreign language.

The fact that rural students take advantage of vocational offerings more often than their more urban counterparts is not necessarily a disadvantage. Job skills and student satisfaction were not parts of the data set. Other studies of similar groupings of students indicate that school completion rates may be higher in rural schools. The data in this study did not include dropout rates or examine the educational or career plans of students. The content of vocational offerings, including agricultural education, should be examined to determine if these types of offerings could contribute to the academic achievement of students in other curricular areas.

Solutions must be found to address these differences. One possible solution is to continue with school consolidation. When schools consolidate, more resources may be available to increase staffing and course offerings. Disadvantages include loss of school identity in a community, increased transportation costs, and increased travel time for students. School consolidation may not be the answer in all circumstances. With the recent advances made in communications technology in the new information society it is possible to make additional course offerings available at a relatively low cost. The greater use of communications technology, computer technology, and distance education could make more offerings available to students regardless of where they live or go to school. Sharing arrangements between neighboring schools may be a part of the solution. Articulation agreements with community colleges or universities may also address some of the differences.

Agricultural educators should examine their programs and course offerings to address some of the differences between rural schools and their suburban and urban counterparts. Course offerings in agricultural education programs can be evaluated and updated to include additional science, mathematics, and oral and written communications skills to address the needs of rural students.

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A Critique By:
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Educational Experiences and Academic Achievement of Rural, Suburban, and Urban Students

The authors provide an extensive review of literature to establish the theoretical framework for this study. They do an excellent job of synthesizing this information to establish the purpose and objectives for this study. They use appropriate research methods and the paper is well written and easily understood.

The purpose of this study was to determine if students in rural areas (schools) are educational disadvantaged in comparison to student who attend schools in urban and suburban areas. The objectives were to: 1) describe and compare the academic courses taken by students, 2) describe and compare student participation in team sports, academic clubs, and vocational clubs, and 3) determine and compare the academic achievement, as measured by cognitive tests, of students.i iAnalysis of the data for the first objective to compare the academic courses taken by students indicated that urban and to a lesser extent suburban students were more likely to be enrolled in rigorous academic and academic tracks when compared to rural students. A comparison of Carnegie units taken also revealed differences in the number of courses taken in science, math, social studies, computer science and foreign language. More information is needed in the explanation of the program types and courses taken to determine if they are simply a function of the increased opportunities available in larger schools or if urban and suburban students do choose more rigorous courses.

Objective two compared participation in team sports, academic clubs, and vocational clubs. The results reported would seem to be logical. Rural students seemed more likely to participate on varsity teams than urban and suburban students. Rates of participation in academic clubs were found to be similar among the three groups. Again, more information is needed to determine if the simple fact that there are differences in the number of student available to participate in these activities rural schools could explain the data reported.

Differences in academic achievement was the focus of the third research objective of this study. Results indicated a difference between rural students and urban and suburban students on all four measures of student achievement used in the study. In all cases, rural students scored significantly lower than the other two groups. It is assumed that these differences are due to the differences identified in the first objective relating to academically rigorous courses selected by students.

The authors provide a good section on conclusions/ recommendations/ implications of this study. The authors do a good job of supporting their conclusions and recommendations based on the data found in the study. This reviewer, however, is forced to ask the question, "So What?" The recommendations to further consolidate and utilize advances in communication technology, and to form sharing arrangements between neighboring schools in not new information. Many schools have been doing this in an attempt to provide a good educational experience for their students for years. These recommendations could have been proposed without completing this study.

Drop-Out Rate??

Integrating Experiential Learning into a Capstone Course: A Proposed Model*

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Introduction/Theoretical Framework

Educational reform in the United States is a constant, on-going process. New ideas and models that are constantly espoused are intended to dramatically improve education. One of these "new" ideas involves experiential learning. The ability to involve one's self in specific experiences, to reflect and conceptualize these experiences, and then to take an active role in experimenting and building on them, is the foundation of experiential learning (Joplin, 1981; Kolb, 1984).

Experiential learning, as well as problem-solving and decision-making abilities, have continually been touted as an essential element in the educational process (SCANS Report for America 2000, 1991). The basic theme among all experiential learning models is that learning through applicable experiences, with requisite reflection and synthesis, provides for the best education (Kolb, 1984; Joplin, 1981). And, it is this experiential learning model that provides the backbone for a capstone course. The course provides a culminating experience, which needs to be carefully monitored so students achieve their stated objectives (Knowles & Hoefler, 1995; Aupperle & Sarhan, 1995).

Experiential learning, which has been shown to be an integral part of capstone programs (Andreasen, 1998), is equally integral to study abroad programs. Empire State College, for example, had incorporated the experiential and capstone concepts into their Principles of International Business Course. Students, who were provided the opportunity to participate in a study abroad program, could learn crucial international business concepts, skills, and other related elements that were not taught in the students' other courses (Herdendorf, 1991).

Conceptually, the main deficit encountered in the research on capstone courses is the direct inclusion of experiential learning activities into the curricula. Although many activities mentioned could be considered experiential in nature, the experiential learning models mentioned earlier are never included nor are they treated as essential components in the make up of the capstone

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courses. It is the discovery of this deficiency that makes this study of unique importance to the discipline.

Purpose and Objectives

The purpose of this study was to review the related literature and theoretical frameworks relating to experiential learning and capstone courses. Further, this study sought to draw implication for the inclusion of experiential learning components and philosophy into capstone courses. Specific objectives were:

1. Identify the theoretical models of experiential learning,
2. Identify and define components of a capstone course, and
3. Develop a model for incorporating experiential learning into capstone courses.

Methods/Procedures

This study employed a historical research methodology. This method is a systematic collection and evaluation of data to describe, explain, and thereby understand actions/events that occurred in the past (Fraenkel & Wallen, 1993). The following sources were used to gather data for this study: ERIC Documentation Reproduction Service, NACTA Journal, Journal of Agricultural Education, and National Satellite Teleconference funded by the United States Department of Agriculture Cooperative States Research Service Higher Education Challenge Grants Program (Project number 208-11-10A-015-3337751). Studies in these references were located through a library systems search completed through August, 1997 at Iowa State University.

Findings

Objective 1: Identify the theoretical models of experiential learning.

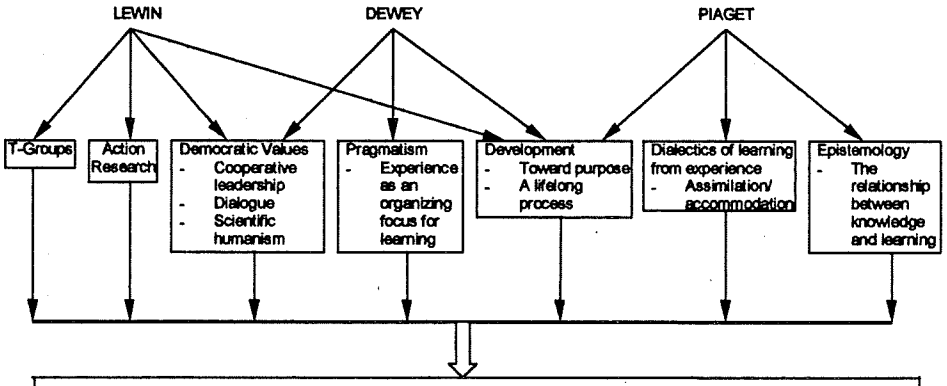
Simply stated, experiential learning is learning through experience. This is the most common definition utilized in the literature (Charalambides, 1984; Garkovich, Bunch, & Davis, 1992; Leske, 1994; Stone, 1994; Wulff-Risner & Stewart, 1997). Although valid reasons exist for incorporating experiences into the curriculum and educational programs, to truly be labeled *experiential* careful adherence to the principles of experiential learning must be a prerequisite.

From the review of the literature, it is apparent that two very distinct views and definitions of experiential learning are present in today's society. One definition focuses on the inclusion of any experience or activity into the curriculum, and the other definition includes a structured debriefing or reflective period within the experiential activities. Both camps espouse the virtues of providing experiences for the development of ideas and concepts in educational settings, but one group goes a step further in its definition of this concept by the inclusion of a structured reflective or debriefing period. This increased or expanded view of experiential learning takes proposes that

learning takes place in a structured, reflective period (Joplin, 1981; Leske, 1994; Stone, 1994) that is essential if experiences are to be converted into higher order cognitive levels.

David Kolb (1984), in his book *Experiential Learning: Experience as the Source of Learning and Development*, summarizes seven themes that provide the theoretical framework for experiential learning. Kolb draws upon the works of Kurt Lewin, John Dewey, and Jean Piaget in forming guiding principles of experiential learning theory (Figure 1).

Lewin's work with T-groups and action research articulates the work of John Dewey (1936) concerning the democratic values guiding experiential learning as well as the view of experiential learning as a life-long process. These views work in concert with Piaget's contributions of the learning process as a dialectic between assimilating experience into concepts and accommodating concepts to experience. Dewey's unique work with pragmatism as well as Piaget's epistemology round out the themes for the principles of experiential theory.



CONTEMPORARY APPLICATIONS OF EXPERIENTIAL LEARNING TEHORY

Social Policy and Action	Competence-Based Education	Lifelong Learning and Career Development	Experiential Education	Curriculum Development
Access and influence on the symbolic/ technological culture for: - Minorities - The poor - Blue-collar workers - Women - Developing countries - The arts	- Assessment of prior learning - Assessment centers - Competence-centered curricula	- The nonuniversity education industry - Adult development programs in higher education - integration of learning and work	- Co-op education - Internships - Simulations - Experiential exercises - On-the-job training/learning	- Implementation of Bruner's manifesto: "Any subject can be respectably taught at any level."

Figure 1. Guiding themes for experiential learning (Kolb, 1984)

Currently there are many models of experiential learning. Most of these models are very similar. However, they all can be directly related to the traditional theories of Lewin, Dewey, and Piaget. The Lewinian model, a four-stage cycle, flows from a concrete experience through observation and reflections to the formation of abstract concepts and generalizations that can then be synthesized into new individualized theories, tested for applicability, and then formulated into new concrete experiences, and the cycle repeated. The Piaget model builds onto the concepts presented by Kurt Lewin. Lewin believed that the learning process was a cyclical interaction between the individual

learner and his/her environment. Lewin proposed that the key to learning lies in the interaction between accommodating and assimilating experiences into higher levels of cognitive functioning.

The model proposed by David Kolb (1984) builds upon the works of Lewin, Dewey, and Piaget (Figure 2). This model depicts learning as a series of transitions among four adaptive modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The four quadrants of Kolb's model deal with the processes whereby knowledge is transformed through experience. Kolb explains that knowledge results from "the combination of grasping experience and transforming it" (p. 41). The knowledge, then, is transformed either through intention or extension and grasped either by comprehension or apprehension. In concrete experience, new content is introduced through new experiences.

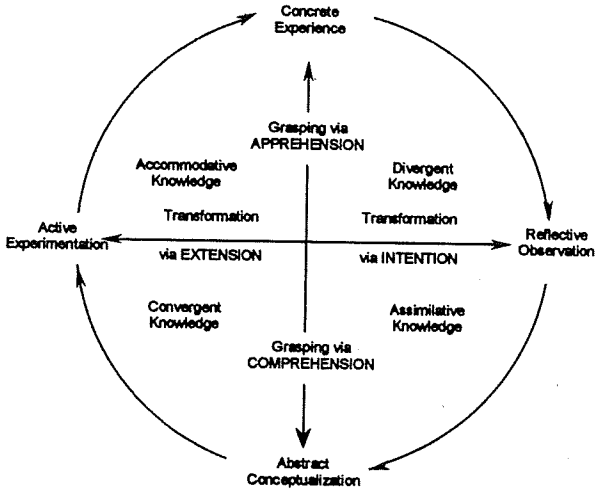


Figure 2. The Kolb model of experiential learning (Kolb, 1984)

In reflective observation, the content is presented through a variety of methodologies. The learner then contemplates and reflects on them before moving to the abstract conceptualization mode. In this mode the learner creates concepts and forms them into generalizations. These concepts and generalizations are then used to make decisions, solve problems, and make applications in the active experimentation mode.

Laura Joplin (1981) developed a five stage model (Figure 3) of the experiential learning cycle. The Joplin model is also a cyclical one with definite starting and ending points. The cycle begins with a *focus* stage where the educational objective is explained, but not too specifically. Next the learner is placed in a stressful situation where an identified problem is addressed. This is the *challenging action* stage. *Support* and *feedback* stages occur throughout the duration of the process, which provide security and information to the student about what they have been doing. And a *debriefing* stage, the last stage follows, which allows for the sorting and ordering of information that may, in turn, lead to the next five-stage cycle.

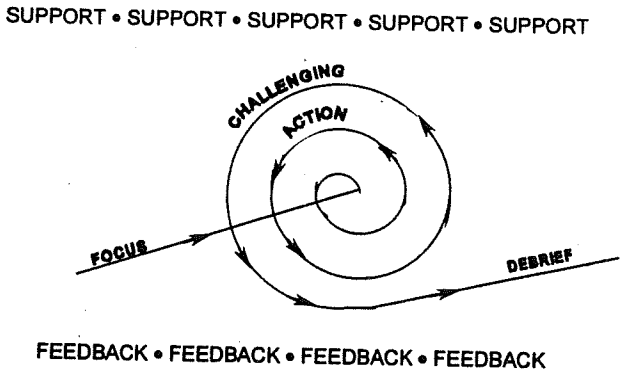


Figure 3. The Joplin model of experiential learning (Joplin, 1981)

Yet another popular model of experiential learning is found in the United States Department of Agriculture's Cooperative States, Research, Education and Extension Service 4-H Program (Figure 5). This model is an adaptation of the Pfeiffer and Jones (1977) model (Figure 4), which is also cyclical in nature and commences with the *experiencing* of a concrete activity and cycles through the subsequent steps of the model. The learner is engaged in an activity with the experience forming the basis of the entire process. The next phase is *publishing*. Publishing refers to the learner sharing or "publishing" the observations with others who have experienced the same activity. This phase is then followed by *processing*. After observations are shared and integrated, they are processed or reflected upon. Next, the *generalizing* phase is utilized to define, clarify, and elaborate on the learner's experiences. The final step is *applying* the results of the experience in a novel setting or to a situation. The application of this new experience in itself begins the cycle anew.

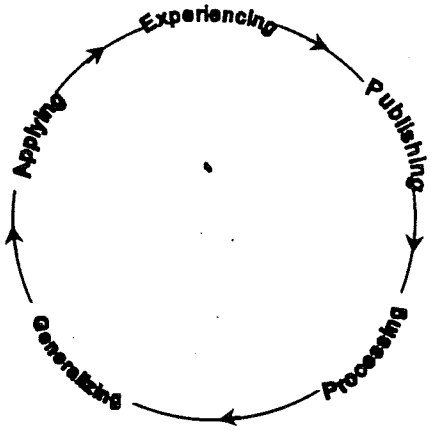


Figure 4. Pfeiffer and Jones model of experiential learning (1977)

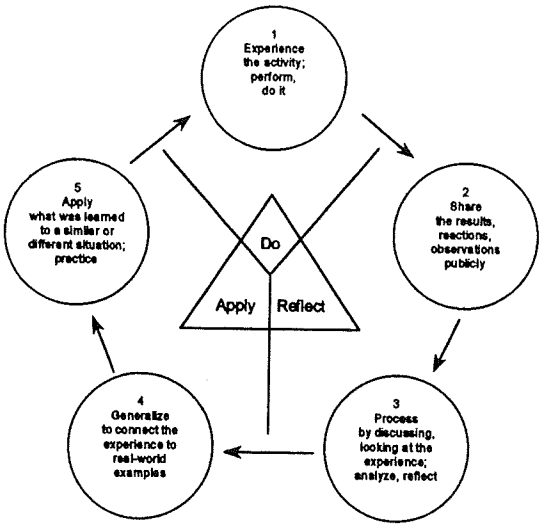


Figure 5. The Experiential learning model used by the CSREES (1994)

Objective 2: Identify and define components of a capstone course.

In 1985, the Association of American Colleges (AAC) published its report entitled *Integrity in the College Curriculum: A Report to the Academic Community.* This report addressed concerns about the decay in the quality of the Nation's Colleges and Universities. The findings support a minimum required curriculum that should include the following items: inquiry, literacy, understanding numerical data, historical consciousness, science, values, art, international and multicultural experiences, and, study in depth. The study in depth area noted the following: a central core of theory and method, a range of topics, a sequence with advancing sophistication, and a means by which final mastery of a discipline's complexity can be shown and assessed (Wagenaar, 1993). This description forms the basis of what is a capstone course.

In a recent study of capstone courses by Crunkilton, Cepica, and Fluker (1997), the authors offer the following definition of a capstone course: "A planned learning Figure 4. Pfeiffer and Jones model of experiential learning (1977) experience requiring students to synthesize previously learned subject matter content and to integrate new information into their knowledge base for solving simulated or real world problems." Crunkilton et al. (1997) further state that a capstone course should "...ease the transition of students between their academic experiences and entry into a career or further study." The course provides a culminating experience that needs to be carefully monitored so that students achieve their stated objectives (Knowles & Hoefler, 1995; Aupperle & Sarhan, 1995).

Six educational outcomes and five required learning activities were identified by Crunkilton et al. (1997). The expected educational outcomes of a capstone course include: problem solving, decision making, critical thinking, collaborative/professional relationships, oral communications, and written communications. Required learning activities include: projects, case studies, or written analyses, small group work, oral communication, intensive writing, and industry involvement. These outcomes and activities have been reiterated throughout the literature involving capstone courses (Zimmerman, 1991; Wagenaar, 1993; Aupperle & Sarhan, 1995; Crunkilton et al., 1997; Zimmerman, 1997).

Objective 3: Develop a model for incorporating experiential learning into capstone courses.

Based on the review of literature and researcher observations, a model for integrating experiential learning processes into capstone courses was developed (Andreasen, 1998). This model (MIELCC) (Figure 6) draws on the research and observations of educators in diverse fields of expertise, but it is oriented toward capstone courses in Colleges of Agriculture, although the benefits and applications of experiential learning and capstone courses are universal.

Research states that one of the principal values of capstone courses is to unify the fragmented disciplinary knowledge associated with the educative process (Zimmerman, 1991; Wagenaar, 1993; Aupperle & Sarhan, 1995; Crunkilton et al., 1997; Zimmerman, 1997). The proposed model begins with this principle in mind. Five learning activities, based on analysis of capstone courses, are offered as essential learning activities for capstone courses. These activities are: problem solving, team work, decision-making, critical thinking, and oral and written communication.

The learning activities and instructional techniques included in the model's required capstone components are activities and techniques rated by students in a College of Agriculture capstone course as being of exceptional quality and the most beneficial to them professionally (Andreasen, 1998). These learning activities and instructional techniques facilitate the experiential process within the capstone course.

The next section of the model is an interpretation of several experiential learning models (Kolb, 1984; Joplin, 1981; Pfeiffer & Jones, 1977) presented in the review of literature. The interpretation and its incorporation into the capstone course concept is the synthesis of this study and review of literature. The five "R's" of the model (receive, relate, reflect, refine, and reconstruct) are a mnemonic device to represent the major areas of the experiential learning model. They are designed to cycle and funnel the required capstone components into a synthesis and integration of the subject matter.

Receive: An activity or experience is received by the learner. This activity or experience may be contrived by the facilitator, or may occur spontaneously during the capstone course or may have occurred during previous courses. This step corresponds with previously cited models, many of them using the term "concrete experience" (Lewin,1951; Piaget, 1971; Kolb, 1984; CSREES, 1992).

Relate: Relating learned experiences to previously gained knowledge ties experiential learning into the capstone course philosophy. Taking fragmented disciplinary knowledge and unifying it is the intent of this step. This step may be referred to as "focus," "internalized reflection," "reflective observation," "sharing," or "processing" in other models and is associated with the next stage, reflect.

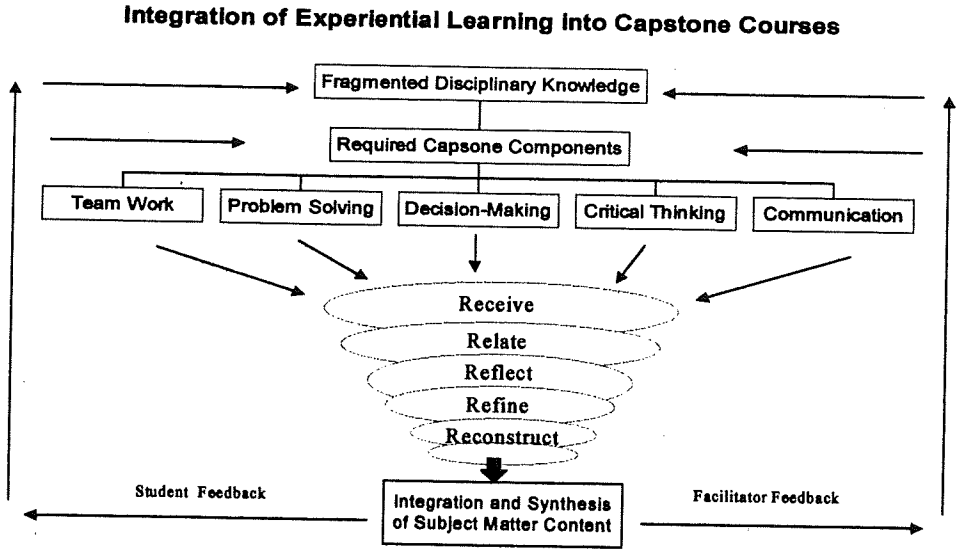


Figure 6. Model for the Integration of Experiential Learning into Capstone Courses (MIELCC)

Reflect: Laura Joplin stated, "True experiential education is characterized by systematic interventions of the learning facilitator with the learner along an experiential path" (Joplin, 1981, p. 156). It is the reflecting on the experiences received and relating them that distinguishes experiential learning from learning through experiences.

Refine: Once knowledge has been related to and reflected upon it must be refined. This refinement process causes further contemplation concerning the applicability of this knowledge and its association to and with other knowledge. This may be associated with "abstract conceptualization" and "generalize" from other experiential leaning models.

Reconstruct: As the vortex of the spiral is reached, experiential learning reconstructs or allows for the synthesis of the subject matter content and its integration into our knowledge base. The Lewinian model calls this step "testing the implications of concepts in new situations," and the CSREES model refers to reconstruct as "apply what was learned to a similar or different situation or practice." Once synthesis and integration have resulted, the spiral of the five R's can be reused, additional knowledge processed, feedback provided, and evaluations made to improve and develop the initial process.

Conclusions/Recommendations/Implications

There is a very real need to relate the concepts of capstone courses and experiential learning. Without this relationship the possibility exists of lessening the educational advantage students have by participating in capstone courses. Without an understanding of the experiential learning process, the surface of knowledge and learning is only scratched. The results of this study show that when learning activities and instructional techniques based on the principles of experiential learning are applied in the capstone setting, the quality and benefits within these courses are improved.

Utilization of the Model for Integration of Experiential Learning into Capstone Courses (MIELCC) provides an actualization of the relationship between and among these educational principles. The Model provides one method of viewing these principles and incorporating them into a more holistic approach to education. Following the experiential learning process depicted in the five R's allows for improvements in education by improving the application and conceptualization of knowledge.

The alternative to ignoring these concepts, principles, and this model is to underutilize the tools and opportunities available to educators. Adherence to them is to improve education and learning for our students.

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A Critique By:
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Integrating Experiential Learning Into a Capstone course: A Proposed Model*

The research questions used to guide this study were to: 1) identify the theoretical models of experiential learning, 2) identify and define components of a capstone course and 3) develop a model for incorporating experiential learning into capstone courses. This study utilized historical research methodology employing a systematic collection and evaluation of data to answer the research questions. This study is well written and follows appropriate techniques for historical research.

To answer the first research question, the authors identify five models of experiential learning and provide an excellent overview of the attributes of each model. All models can be directly related to the traditional theories of Lewin, Dewey, and Piaget. The authors review of these models provided excellent insight and background for the synthesis needed for the third research objective of the study.

The second research question to identify and define components of a capstone course is also well documented by the authors. The authors identity problem solving, decision making, critical thinking, collaborative/professional relationships, oral communications, and written communications as the outcomes necessary for a capstone course. These outcomes were also utilized to assist the authors with research question three.

The authors utilize excellent techniques in historical research to assist them in the development of a model for incorporating experiential learning into capstone courses. The authors identify five "R's" of the model: receive, relate, reflect, refine, and reconstruct. The authors do a good job of explaining the five "R's" and illustrating their use in their model.

The authors develop and present a Model for Integration of Experiential Learning into Capstone Courses that provide an actualization of the relationship between and among these educational principles. The model provides one method of viewing these principles and incorporating them into a more holistic approach to education.

Again, the authors are to be commended for utilizing a method of research that hasn't been utilized extensively in Agricultural Education research. They develop an excellent model for integrating experiential learning into a capstone course. It would have been helpful if the authors has taken some additional risks in the conclusion/recommendations section to provide some additional insight as to how and what could be done to improve capstones courses in agricultural education. Typically, one of our major capstone courses is student teaching. How can we utilize the five "R's" and this model to improve that experience for students.

Should be in all classes??

Perceived Benefits of Selected Experiential Learning and Instructional Techniques in a College of Agriculture Capstone Course at Iowa State*

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Introduction/Theoretical Framework

The Association of American Colleges (AAC) established the basis of capstone courses by noting the need for a central core of theory, sequential learning, and the mastering of a discipline's complexity. Wagenaar (1993) further summarized capstone courses by stating, "The introductory course exposes the student to the basics of the discipline. The capstone course revisits these basics." In a recent study by Crunkilton, Cepica, and Fluker (1997), a concise definition of capstone courses is offered, "...a planned learning experience requiring students to synthesize previously learned subject matter content and to integrate new information into their knowledge base for solving simulated or real world problems..." Furthermore, a capstone course should "...ease the transition of students between their academic experiences and entry into a career or further study..." The capstone course should provide a culminating experience, which needs to be carefully monitored so that students achieve their stated objectives (Knowles & Hoefler, 1995; Aupperle & Sarhan,1995).

The concept of experiential learning has been around for a long time. Aristotle, the Greek philosopher, postulated the idea that knowledge comes from experience. John Dewey (1938), considered by many to be the founder of experiential education, helped define the role of experience in learning. Experiential learning has since been adopted by a number of educational reformers (Kraft (1995), Piaget (1971), and Lewin (1951). More recently, the National Council for Agricultural Education's mission statement as stated in *Reinventing Agriculture Education for the Year 2020* states that educational processes should include experiential learning.

Educational outcomes, learning activities, and instructional techniques are a necessary prerequisite for capstone courses. Crunkilton, et al., (1997) have identified six educational outcomes: problem-solving, decision-making, critical thinking, collaborative/professional relationships, oral communications and intensive writing, and industry involvement. These educational outcomes are intended to prepare students for employment, create a greater awareness of the complex interrelationships between society, culture, business, and work, and serve as a facilitator of school-to-work transition or further study.

Learning activities and/or instructional techniques must be an integral part of the capstone course and include: projects, case studies, or issue analysis; small group work; oral communication; intensive writing; and industry involvement (Andreasen, 1998, Crunkilton, et al.,1997). Projects, case studies, or issue analyses are designed so that students gather and interpret data relative to a specific problem. Small group work (committees) is an instructional technique that facilitates the process of problem-solving using projects, case studies, or issue analysis. Oral communication activities are intended to be informative and stimulating to the class and complement written communication. Intensive writing instructional techniques are written assignments related to problem-solving and

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decision-making situations. Lastly, industry involvement integrates students and industry representatives in a planned learning environment to achieve an educational outcome.

The results of alumni surveys help enhance the educational opportunities of constituents and keep educational programs on the cutting edge of technology. Gaining employability, job satisfaction, relevance of education to current job, usefulness of training, job satisfaction, salary level, and educational attainment are all examples of how alumni surveys have been used in the evaluation of educational programs (Adams, 1995). According to Byler and Williams (1977), data gathering instruments provide useful information to enhance course evaluations and the achievement of course objectives. Heilberger (1996) concluded that alumni surveys increase the effectiveness of teaching and learning, which in turn better prepares future course completers.

The Agricultural Education and Studies 450 course (AgEdS 450) serves as the Agricultural Education and Studies Department's capstone course. AgEdS 450 is required of all Agricultural Studies majors (the department's general agriculture degree program) and is offered as an elective for Agricultural Education majors and other majors within the College of Agriculture (Andreasen, 1998).

Purpose and Objectives

The purpose of this study was to determine the perceptions of AgEdS 450 course completers regarding the learning activities/instructional techniques used in this capstone course as those perceptions related to their first professional position. A secondary purpose was to determine the perceptions of course completers with respect to the quality of the managerial and course procedures used.

Specific objectives of the study were:

1. to describe the characteristics of the AgEdS 450 course completers;
2. to identify the perceptions regarding selected experiential learning activities used in the capstone course, and
3. to identify the perceptions regarding the learning activities and instructional techniques as they related to the quality of the capstone course.

The study also provides a database of information on the impact of experiential learning in a capstone course on its graduates. It allows for comparison to be made among groups of students and selected demographic variables aiding in the pro-active planning for future sections of AgEdS450.

Methods and Procedures

This study used a descriptive survey design. Descriptive survey research provides information and data that can be utilized to improve education and educational delivery systems (Borg and Gall, 1989). The population consisted of 335 course completers enrolled in AgEdS 450 between the Fall Semester, 1991 and the Summer Semester, 1997. This time frame was selected because research data had not been collected on these course completers. Based on the unequal population size among the three targeted groups (Agricultural Education major, Agricultural Studies major, and all other majors), independent random samples were generated following the model set up by Krejcie and Morgan (1970). A 95% confidence interval was established. The total random sample of 214 course completers was utilized, with 150 registered Agricultural Studies majors, 38 Agricultural Education majors, and 26 other majors.

The survey instrument was developed by the researcher from related studies (Soomro (1991), Stevenson (1985), and Hamilton (1979)), input from faculty and staff familiar with AgEdS 450, and the researcher's graduate committee. The questionnaire was pilot tested utilizing the Fall, 1997, AgEdS 450 class to insure face validity and to test the reliability of the instrument. Reliability coefficients were calculated resulting in scores of .93, .78, and .85 for Parts I, II, and III.

The questionnaire consisted of four parts. Part I identified the benefits of the course to the first agriculture position of the completers using a 5-point Likert scale. Part II contained ten comparison questions asking respondents to compare selected experiential learning activities with other courses taken. Respondents selected one choice of either "less than," "equal to," or "more than." Part III consisted of fifteen questions concerning the value and quality of selected learning activities and instructional techniques as they related to the quality of the course using a five-point Likert-type scale. Demographic data were gathered in Part IV.

The cover letter, questionnaire, and self-addressed stamped envelope were mailed to the target population in November, 1997. The Dillman Total Design Method (Dillman, 1978) was followed for subsequent mailings. A total of 134 usable instruments were returned for a response rate of 62.6%.

A random survey of non-respondents indicated no statistically significant differences between early respondents and non-respondents. Therefore, the results are generalizable to the population from which the sample was drawn.

Findings

Objective 1: To describe the characteristics of the AgEdS 450 course completers.

Selected demographic characteristics were collected from the course completers. The preponderance of students enrolling in the course were male (85%), had a farm background (94.1%), and enrolled in AgEdS 450 one time (84.4%). Five undergraduate curricula were represented in the sample: Agricultural Studies (71.4%), Agricultural Education (16.7%), Agricultural Business (9.5%), Animal Science (.8%), and Agronomy (.8%).

Sixty percent of the course completers entered agribusiness, industry positions, or other jobs as their first professional position. Working in farming operation (family or non-family) was the first professional position of 40% of the respondents.

Students may enroll in AgEdS 450 during the spring, summer, or fall semesters. The majority of the students enroll in the spring or fall semesters. Slightly more than 10% enrolled in the summer class. Nearly 85% of the respondents enrolled only once because of the high demand for the class.

There was a fairly equal distribution by term and year of graduation with the exception of 1992 and 1997. These years accounted for less then 5% of the responses. No responses were received from former participants in the Summer, 1992 and Summer, 1996. Responses were received from 67 former participants from Spring, 1992 through Fall, 1994 and 68 from Spring, 1995 through Summer, 1997.

Objective 2: To identify the perceptions regarding selected experiential learning activities used in the capstone course.

Table 1 shows the means and standard deviations of perceived benefits relating to experiential learning in preparation for the respondentlls first professional position. Scores ranged from 3.69 to 4.81 with a grand mean of 4.16. Team building activities such as working as a team to solve problems (4.81) and group decision-making skills (4.47) rated the highest as beneficial experiential activities. Clustered together were the opportunity to exchange ideas (4.25), being responsible for own learning (4.17), class committees (4.13), and developing human relation skills (4.09).

When comparing selected demographic variable to respondents' perceptions regarding experiential learning, no statistically significant differences were found for gender, background, and semester enrolled. However, females tended to rate their perceptions related to experiential learning higher than males. Likewise, students with a non-farm background rated their experiences slightly higher than students with farm backgrounds. No observable trend could be noted based on the semester enrolled. Statistically significant differences ($p<.05$) were found when comparing employment area, term and year of graduation, and undergraduate major and perceptions towards experiential learning. The mean scores for experiential learning were significantly higher for course completers who entered teaching as their first employment area. Apparently, they recognized the benefit of experiential learning in AgEdS450.

Table 1: Means and standard deviations of perceived benefits of relating to experiential activities in the capstone course in preparation for first professional position*

Experiential Learning	Mean	SD
Group decision-making skills	4.47	.58
Opportunity to exchange ideas	4.25	.54
Responsible for own learning	4.17	.65
Class committees	4.13	.73
Development of human relation skills	4.09	.62
Develop alternatives to solve problems	4.02	.69
Delegate responsibility	3.69	.92
Grand mean	4.16	.41

Note: *1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree.

Objective 3: To identify the perceptions regarding the learning activities and instructional techniques as they related to the quality of the capstone course.

Respondents were asked to rate the quality of learning activities and instructional techniques used in AgEdS 450. A five-point scale (1=poor, 2=below average, 3=average, 4=above average, and 5=excellent) was used. The means and standard deviations are reported in Table 2. Learning activities were defined as course components using hands-on approaches. Instructional techniques comprised of pedagogical methods utilized in the presentation of course materials for the achievement of course objectives.

Participating in the management of the farm (4.10) and working with farm staff (4.07) were the highest rated learning activities by the course completers. Closely grouped together were "electing class officers" (3.89) and "having a work experience on the farm" (3.89). Rating the lowest as learning activities were "contacting and interacting with vendors" (3.68) and "using ISU faculty and staff as speakers" (3.42). The grand mean for all learning activities was 3.82.

Table 2: Means and standard deviations for quality of the capstone course AgEdS 450 relating to learning activities and instructional techniques*

	Mean	SD
Learning Activities:		
Participating in the management of the farm	4.10	.77
Working with farm staff to solve problems	4.07	.78
Electing class officers	3.89	.89
Having a work experience on the farm	3.89	.97
Analyzing a strategic issue	3.72	.77
Contacting and interacting with vendors	3.68	.89
Using ISU faculty and staff as speakers	3.42	.84
Grand mean	3.82	.84
Instructional Techniques:		
Using a real farm as a laboratory	4.40	.74
Interacting with fellow students	4.25	.69
Utilizing classroom and laboratory activities	4.13	.79
Using committees in decision-making	4.10	.78
Preparing and presenting oral reports	3.77	.82
Having outside speakers present information	3.62	.94
Developing written reports	3.41	.85
Utilizing computer technology to collect data	3.14	1.04
Grand mean	3.85	.83

*Note: 1=poor, 2=below average; 3=average, 4=above average, 5=excellent.

The highest rated instructional technique was "using a real farm as a laboratory"(4.40) followed by "interacting with fellow students" (4.25). Closely rated were "utilizing classroom and laboratory activities" (4.13) and "using committees in decision-making" (4.10). The lowest rated item was "utilizing computer technology to collect data" (3.14). The grand mean for all instructional techniques was 3.85 indicating that the instructional techniques were "above average."

An analysis of the quality of learning activities and instructional techniques by employment area, semester enrolled, term and year of graduation, and undergraduate major was performed using an analysis of variance and the Scheffé post hoc test. The results are shown in Table 3. When grouped by employment area, statistically significant differences were found in instructional techniques. Teachers rated these activities significantly higher than the other two groups. Statistically significant differences were found when the data were grouped by term and year of graduation. More recent graduates rated the quality of learning activities and instructional activities significantly higher than earlier graduates did. Likewise, Agricultural Education majors rated the instructional activities significantly higher than the Agricultural Studies majors did. Both groups are housed in the same department indicating that the differences in curriculum between the two majors plays a role in the perceived quality of the instructional techniques in this capstone course.

Table 3: Test of statistically significant differences for perceived benefits of learning activities and instructional techniques as related to selected demographic variables.

	t-value	F-ratio	Demographic variable					
			Gender					
			Male (n=114)		Female (N=19)			
			Mean	SD	Mean	SD		
Learning activities	-.485		3.82	.57	3.89	.63		
Instructional techniques	-1.059		4.16	.40	4.26	.49		
			Background					
			Farm (n=126)		Non-farm (n=7)			
			Mean	SD	Mean	SD		
Learning activities	.452		3.82	.57	3.91	.56		
Instructional techniques	.162		4.16	.424	.30	.26		
			Employment Area					
			Farming (n=53)		Teaching (n=6)		Other (n=68)	
			Mean	SD	Mean	SD	Mean	SD
Learning activities		2.691	3.74	.65	4.24	.31	3.90	.50
Instructional techniques		3.681	4.11[a]	.43	4.56[a]	.42	4.20	.37
			Semester Enrolled					
			Fall (n=53)		Spring (n=48)		Summer (n=13)	
			Mean	SD	Mean	SD	Mean	SD
Learning activities		.488	3.78	.62	3.85	.48	3.65	.72
Instructional techniques		.422	4.20	.41	4.16	.42	4.06	.47
			Term and Year of Graduation					
			1[b] (n=26)		2[c] (n=70)		3[d] (n=39)	
			Mean	SD	Mean	SD	Mean	SD
Learning activities		3.323	3.59[e]	.63	3.85	.57	3.96[e]	.52
Instructional techniques		3.054	4.00[f]	.37	4.18	.43	4.26[f]	.37

		Undergraduate Major					
		Ag. Ed. (n=21)		Ag. St. (n=90)		Other (n=14)	
		Mean	SD	Mean	SD	Mean	SD
Learning activities	.581	3.93	.61	3.80	.59	3.93	.46
Instructional techniques	4.401	4.37[g]	.50	4.10[g]	.40	4.29	.28

Note: [a e f g]Means are statistically significantly different ($p<.05$)
[b]Spring Semester 1992 - Fall Semester 1993
[c]Spring Semester 1994 - Fall Semester 1995
[d]Spring Semester 1996 - Summer Semester 1997

Summary, Conclusions, Recommendations

The expected outcomes of capstone courses are based, in part, on the types of instructional methodologies employed in that course. For capstone courses, both a "summative" philosophy and requisite pedagogical traits must be present. The role that experiential learning plays is to provide a vehicle for summarizing the activities characterized in capstone courses. The experiential process provides for integration, synthesis, and evaluation of the activities desired and is deemed essential to a capstone course.

For AgEdS450, the experiential learning activities and instructional techniques were all highly rated by the respondents. Of greatest benefit was the ability to work in teams to solve problems. Additionally, course completers rated such experiences as "group decision-making," "exchanging ideas," "self-directed learning," and "developing human relations skills" as being beneficial. All were rated above 4.0 on a 5.0 scale. The nature of AgEdS450 as a capstone course is, in fact, very experientially based. Class activities are structured such that students are empowered to make decisions, solve problems, and work in teams. The highly beneficial nature of these activities is a positive reflection on the quality and durability of the course.

Based on the findings of this study, several conclusions and implications can be made.

1. Respondents indicated that they agreed that the experiential learning activities and enterprise management activities were beneficial to them in their first professional position. This conclusion is supported by Soomro (1991), who found that the content and procedures in AgEdS450 were useful, appropriate, and beneficial to respondents.

2. AgEdS450 clearly fits the Crunkilton, et al., (1997) definition of a capstone course. The expected educational outcomes (problem-solving, decision-making, critical thinking, collaborative and professional relationships, oral communication, and written communication) as noted in the course syllabus, fit the established criteria.

3. Kolb's model (1984) depicts experiential learning as a series of transitions among four adaptive modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Current experiential learning and enterprise management activities within AgEdS450 incorporate those concepts, and students generally transfer the knowledge gained through the course into learning experiences. This research supports that conclusion and is further supported by the research data.

4. Because few statistically significant differences were found regarding experiential learning and enterprise management activities, it can be concluded that these experiences are appropriate for the course and beneficial to course completers.

5. The integration of student-directed learning along with the student-teacher interaction is critical in this capstone course. The course should be evaluated on a routine basis to provide feedback to course planners to insure that course objectives are being met.

6. Capstone courses place a strong emphasis on the application of material previously learned in other courses. AgEdS450 should strive to build on that concept and revise course objectives to reflect the changing nature of material learned by student in other College of Agriculture classes.

7. The highest rated instructional technique was being able to use a "real farm" as a laboratory. The benefits of using a "real farm" rather than a "case study farm" allow students to visualize the actual application of their decisions, analyze them, and evaluate them in the context of an actual situation.

8. Instructional techniques in this capstone course rely heavily on student to student interaction through class committees, work activities, and class leadership. The course completers felt that the quality of the course was enhanced through this interaction and that valuable lessons were learned in respecting the ideas of fellow class participants.

9. A wide variety of instructional techniques related to oral and written presentations are used throughout the course. These instructional techniques were rated "average" to "above average" in terms of quality.

Implications

Implications from this study can be applied to other capstone courses in colleges of agriculture. The findings give a clear view of the importance of experiential learning in capstone courses. Experiential learning can serve as an integral part of the educational processes related to capstone courses. Capstone courses are prevalent among all disciplines in colleges and universities across the nation. They provide an opportunity to incorporate previously learned, often disjointed, information into an interconnected contextual frame of reference from which transition into a career or further study can be made.

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Perceived Benefits of Selected Experiential Learning and Instructional Techniques in a College of Agriculture Capstone Course at Iowa State University

This research is part of a larger work involved in identifying and utilizing experiential learning experiences to improve instruction in a college of agriculture. The objectives of this research were to: 1) describe the characteristics of the AgEdS 450 course completers, 2) identify the perceptions regarding selected experiential learning activities used in the capstone course, and 3) to identify the perceptions regarding the learning activities and instructional techniques as they related to the quality of the capstone course. The authors utilized appropriate research techniques and provided good explanation of the methodology used in the study.

The first objective was to describe the characteristics of AgEdS 450 completers. Program completers are described as mostly male with farm backgrounds and from a variety of majors within the college of agriculture. It would have been very helpful to this reviewer if the name of the course and course objectives had been identified in the article. Since this reviewer is somewhat knowledgeable of the program at Iowa State, it is assumed that this is the course where students actually make decisions and do some of the work on the farm that is under the jurisdiction of the Agricultural Education and Studies Department. This could only be inferred from the text of the article.

Objective two was to identify the perceptions regarding selected experiential learning activities used in this capstone course. Perceived benefits included working as a team to solve problems, developing group decision making skills, finding opportunities to exchange ideas, and being responsible for their own learning. The authors indicate that mean scores for experiential learning were significantly higher for course completers who entered teaching as their first employment area and that they apparently recognized the benefits of experiential learning. Data supporting this conclusion were not provided until one reads the information supporting objective three of the study.

The last objective, to identify the perceptions regarding the learning activities and instructional techniques as they related to the quality of the capstone course, provided positive insight regarding students participation of AgEdS 450. Participating in the management of the farm and working with farm staff were the highest rated learning activities by the course completers. The highest rated instructional technique was using a real farm as a laboratory.

The authors conclude by indicating that the findings from this study give a clear view of the importance of experiential learning and that implications can be applied to other capstone courses in the college of agriculture. It would have been helpful if the authors had elaborated regarding the implications section. What are some other examples of how experiential learning could be applied to other courses? What are some specific recommendations for others that are trying to incorporate experiential learning into their courses?

The authors are to be commended for providing validation for the need for and benefits of experiential learning even in higher education. Further research should be conducted to connect these experiences with student benefits in their chosen careers.

Attitudes of Agriculture Teachers, Teacher Educators and State Staff Toward Recruitment

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Introduction/Theoretical Framework

Agricultural education has been an integral component of the American educational system since its inception. However, it serves only a fraction of the students who could be enrolled in this type of educational program. Although peak enrollments have been impressive, agricultural educators have not been able to sustain a consistent pattern of growth. For example, after several years of steady increase, agricultural enrollments sharply increased until they peaked in 1977 at 697,500 students (National FFA Organization, 1986). However, by the early 1980s, enrollments in some states had declined by as much as 60% (Dyer & Osborne, 1994). Continuing this vacillating pattern, enrollments today are approaching the peak levels of the 1970s (Speer, 1998).

Why do agricultural education enrollments fluctuate so dramatically? The current research base does not answer this question. However, Hoover and Scanlon (1991a) reported that students faced two barriers to enrollment in agricultural education: agriculture's image and the perceived future value of agricultural education. Based on these findings, it appears that enrollments are dependent upon the perceived stability of the agricultural industry. Can extra effort in recruiting by teachers compensate for unfavorable perceptions? Again, current research does not answer the question, but does show that teachers are not using some of the most effective recruiting strategies because they are too time-consuming (Hoover & Scanlon, 1991b).

While some recruitment tools have been identified, there does not appear to be a successful model for recruitment. Moore, Kirby, and Becton (1997) identified block scheduling as a tool that substantially increased the number of agriculture students. However, they also reported that block scheduling offered little or no impact on either instructional quality or supervised agricultural experience, and a negative impact on FFA membership. Hoover and Scanlon (1991b) identified technology as a recruiting tool. Other studies (Ries & Kahler, 1997; Andreasen, Dyer, & Breja, 1997) have identified parents, agriculture teachers, and other students as being sources of influence to enroll in high school agriculture programs.

According to the National Research Council (1988), agriculture is too important a topic to be taught only to a relatively small percentage of students. As such, agricultural education programs around the nation have experienced several enrollment fluctuations. Anecdotal data suggests those fluctuations are caused by several factors which could be addressed. Specifically, those factors include demographic characteristics (gender, ethnicity, geography, experience in agriculture), a failure on the part of teachers to recruit, a failure on the part of teacher educators to prepare pre-service teachers for the task of recruitment, and a failure on the part of state staff to support teachers in recruitment efforts. Limited research efforts have sought to validate this data, however. This study sought to explore those suppositions by identifying and analyzing the attitudes of agriculture teachers, teacher educators, and state staff toward recruitment.

Expressed attitudes are excellent predictors of intent (Fishbein & Ajzen, 1975). According to Fishbein and Ajzen, intentions to support or participate in an activity can be predicted based upon knowledge, observation, or other information about some issue. This model suggests that a person's intent to become actively involved in a recruitment program, or to support that program, may be predicted by analyzing the participant's beliefs about recruitment. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate them positively. As applied to this study, if teachers, teacher educators, or state staff are interested in, knowledgeable about, have a positive image of, and are involved in recruitment efforts, those individuals will likely

support and be actively involved in recruitment efforts in both word and action. Consequently, if beliefs are negative, the individual's interest, knowledge, and level of support will likely also be limited.

Purpose

The primary purpose of this study was to determine the perceptions of secondary agricultural education teachers, university agricultural education teacher educators, and state agricultural education staff toward recruitment of students into high school agriculture programs. Specifically, this study addressed the following research questions and tested the corresponding null hypothesis. A null hypothesis was tested since a review of literature failed to support a directional hypothesis.

1. What were the attitudes of agriculture teachers, teacher educators, and state staff toward student recruitment?
2. How did the attitudes of agriculture teachers, teacher educators, and state staff differ toward recruitment?

HO:There is no difference in the attitudes of high school agriculture teachers, teacher educators, or state staff toward recruitment of students for agriculture programs.

3. What were the influences of demographic characteristics (gender, ethnicity, school/community type, region, and years of experience) on attitudes toward student recruitment?

Methods/Procedures

The project used a descriptive survey design. A stratified sample of high school agricultural education teachers, university teacher educators, and state staff from each state and province offering instruction in agricultural education was selected (N = 402). The Directory of Teacher Educators in Agricultural Education (Graham, 1997) and Directory of National FFA Organization State Advisors and Executive Secretaries (National FFA Organization, 1997) were used as population frames for the selection of university teacher educators and state supervisory staff members, respectively. Teacher educators were randomly selected from state institutions based upon their active involvement in pre-service teacher education (n = 60). A census sample of state staff members (including FFA executive secretaries where separate from state departments) was selected from each state department of education in which agricultural education is taught, including Guam, Puerto Rico, and the Virgin Islands (n = 72). An expert group of high school agriculture teachers were identified by teacher educators and state staff respondents based upon their perceived knowledge of recruitment issues. All members of this group were included in the sample of teachers (n = 270).

The data-gathering instrument for this study was developed by the researchers. Face and content validity were determined using an expert panel of teachers, teacher educators, and state staff not included in the study. Based upon recommendations of the panel, revisions were made to the instrument. The instrument was pilot tested using 25 agriculture teachers, teacher educators, and state staff who were also not participants in the study. Reliability as a measure of internal consistency was calculated using the Spearman-Brown coefficient (r = .69).

The questionnaire contained two sections. The first section was comprised of questions to determine demographic information of the respondents and consisted of open-ended and short-answer questions. The second section contained statements designed to measure the attitudes of the three groups toward recruitment of students into high school agriculture programs. In this section, participants were asked to indicate the degree to which they either agreed or disagreed with each statement. A five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree) was used for each statement in the second section.

Questionnaire packets were mailed to participants followed by a postcard reminder approximately two weeks later. A second questionnaire packet was mailed to non-respondents approximately four weeks after the first mailing. A total of 270 respondents completed the questionnaire for a response rate of 63.0% of teachers, 63.3% of teacher educators, and 86.1% of state staff. According to Krushat and Molnar (1993), non-response error can effectively be addressed by comparing early and late respondents, since late respondents tend to reply similarly to non-respondents. A comparison of these groups revealed no differences between the two categories of respondents.

Data were analyzed using descriptive statistics, including measures of central tendency and variability. Data were organized and analyzed using the Statistical Package for the Social Sciences (SPSS). Categorical analysis was performed using the following scale: Strongly Disagree (M = 0-1.49), Disagree (M = 1.50-2.49), Uncertain (M = 2.50-3.49), Agree (M = 3.50-4.49), Strongly Agree (M = 4.50-5.0). The null hypothesis was tested at a .05 alpha level. Post hoc analyses were performed using Tukey's b test.

Results and Findings

Research Question 1: What were the attitudes of agriculture teachers, teacher educators, and state staff toward student recruitment?

Respondents expressed attitudes supportive of the recruitment of students into high school agricultural education programs. However, problems were identified. As indicated in Table 1, respondents strongly agreed with the statement that "all high school agriculture programs should have an active recruitment plan." They agreed that all students can benefit from enrollment in agricultural education, that gender and ethnic diversity are important to the success of agriculture programs, that the future of agricultural education is dependent upon recruitment, and that high quality students should be targeted in recruitment efforts. They further agreed that agriculture teachers are, and should be, accountable for recruitment of students.

Table 1: Areas of Agreement in Attitudes Toward Recruitment of Students into Agricultural Education

Statement	M	SD
All high school agriculture programs should have an active recruitment plan.	4.64	.69
All high school students can benefit from enrollment in agriculture courses.	4.38	.93
Gender diversity is important to the success of agriculture programs.	4.29	.86
The future of agricultural education is dependent upon recruiting students.	4.26	.87
Most high school students should take some course work in agriculture.	4.03	.89
Agriculture teachers are accountable to local school systems for recruitment.	3.90	.98
Students of higher academic quality should be targeted in recruitment programs.	3.76	.95
High school agriculture teachers should be accountable for recruitment of students into their agriculture programs.	3.73	.97
Ethic diversity is important to the success of agriculture programs.	3.62	1.03
Recruitment efforts should be focused on high quality students.	3.53	1.10

Note. Strongly Disagree (M = 0-1.49), Disagree (M = 1.50-2.49), Uncertain (M = 2.50-3.49), Agree (M = 3.50-4.49), Strongly Agree (M = 4.50-5.0).

Respondents expressed attitudes that were described as "Uncertain" on several statements (Table 2). Many of those statements dealt with the image of agricultural education programs by administration, parents, students, and other teachers. In addition, the respondents expressed attitudes in the "Uncertain" range on whether administrators should require teachers to recruit and whether teachers who recruit should be paid higher salaries than those who do not. In addition, respondents were uncertain as to whether they receive adequate support from state staff members in recruitment activities.

Respondents disagreed with the statements that guidance counselors have a positive image of agricultural education (M = 2.45, SD = .98), that teachers receive adequate training in recruitment techniques from teacher certification programs (M = 2.31, SD = .98), and that only students pursuing careers in agriculture should enroll in agriculture classes (M = 1.15, SD = .78). Respondents strongly disagreed that agriculture courses should only be limited to students with farm backgrounds (M = 1.22, SD = .43).

Table 2: Areas of Uncertainty in Attitudes Toward Recruitment of Students into Agricultural Education

Statement	M	SD
High school administrators value student recruitment by agriculture teachers.	3.46	1.04
Agriculture teachers do an adequate job of recruiting ethnically diverse student populations.	3.43	.99
Most administrators have a positive image of agricultural education.	3.19	1.01
Most parents have a positive image of agricultural education.	3.06	1.02
Recruitment is easier in programs that are more scientific in nature.	3.04	.97
Administrators should require high school agriculture teachers to recruit.	3.04	1.09
Agriculture teachers receive adequate support from state staff members on recruitment activities.	2.96	1.10
Teachers with active recruitment programs should be paid higher salaries.	2.92	1.22
Teachers in subjects other than agriculture have a positive image of agricultural education.	2.92	1.02
Most high school students should take some course work in agriculture.	2.91	1.00
Students of lower academic ability should be targeted in recruitment programs.	2.89	1.05
Agriculture teachers do an adequate job of recruiting ethnically diverse student populations.	2.73	.98

Note. Strongly Disagree (M = 0-1.49), Disagree (M = 1.50-2.49), Uncertain (M = 2.50-3.49), Agree (M = 3.50-4.49), Strongly Agree (M = 4.50-5.0).

Research Question 2: How did the attitudes of agriculture teachers, teacher educators, and state staff differ toward recruitment?

For the purpose of answering this question, the null hypothesis of no difference in the attitudes of high school agriculture teachers, teacher educators, or state staff toward recruitment of students for agriculture programs was tested at the .05 alpha level. An analysis of variance revealed significant differences between attitudes of teachers, teacher educators, and state staff on several issues. Therefore, the null hypothesis was rejected.

As noted in Table 3, attitudes of high school agriculture teachers differed significantly from state staff and teacher educators on several key issues. At the forefront of those differences were conflicting attitudes toward the image of agricultural education. Teachers' attitudes were significantly different from those of state staff and teacher educators on their beliefs that students, parents, guidance counselors, administrators, and other teachers have a positive image of agricultural education. In each instance, teachers believed the image to be more positive than did state staff or teacher educators. In addition to issues of image, teachers and teacher educators differed in attitudes toward the benefits of agriculture courses for all students, with teachers expressing more positive attitudes.

Table 3: Summary Data and Analysis of Variance of Attitudes of Teachers, Teacher Educators, and State Staff

Variable	n	M	SD	F
Most students have a positive image of agricultural education				19.51*
Teachers	170	3.18[a]	1.05	
Teacher Educators	37	2.32	.67	
State Staff	62	2.52	.74	
Most parents have a positive image of agricultural education				19.84*
Teachers	169	3.34[a]	1.01	
Teacher Educators	37	2.54	.73	
State Staff	62	2.61	.89	
Most counselors have a positive image of agricultural education				16.89*
Teachers	168	2.70[a]	1.04	
Teacher Educators	37	2.05	.62	
State Staff	62	2.00	.75	
Most administrators have a positive image of agricultural education				14.34*
Teachers	169	3.43[a]	1.00	
Teacher Educators	37	2.78	.89	
State Staff	62	2.77	.91	
Most other teachers have a positive image of agricultural education				19.49*
Teachers	168	3.20[a]	1.02	
Teacher Educators	37	2.62	.79	
State Staff	62	2.35	.87	
All high school students can benefit from enrollment in agriculture courses				3.71*
Teachers	170	4.49[a]	.94	
Teacher Educators	38	4.11[b]	.80	
State Staff	62	4.24[ab]	.94	
Ethnic diversity is important to the success of agriculture programs				11.89*
Teachers	169	3.42[a]	1.01	
Teacher Educators	37	4.24[b]	.86	
State Staff	62	3.81[c]	1.01	

Table 3 (continued): Summary Data and Analysis of Variance of Attitudes of Teachers, Teacher Educators, and State Staff

Variable	n	M	SD	F
Agriculture teachers do an adequate job of recruiting ethnically diverse student populations				24.21*
Teachers	166	3.02[a]	.90	
Teacher Educators	38	2.08	.82	
State Staff	62	2.35	.94	
Gender diversity is important to the success of agriculture programs				2.22
Teachers	170	4.22	.95	
Teacher Educators	38	4.53	.56	
State Staff	62	4.35	.73	
Agriculture teachers do an adequate job of recruiting gender diverse student populations				6.88*
Teachers	168	3.60[a]	.87	
Teacher Educators	38	3.13	1.19	
State Staff	62	3.15	1.08	
Agriculture teachers receive adequate training in recruitment techniques from teacher certification programs				5.72*
Teachers	168	2.31	.95	
Teacher Educators	38	2.74[a]	1.03	
State Staff	62	2.06	.97	

Note. Means with different letter superscripts within categories are significantly different.
* $p < .05$

Diversity was another issue with which the three groups expressed differing attitudes. Each of the groups differed in their belief that ethnic diversity is important to the future of agricultural education. Teacher educators expressed the most positive attitudes toward the need to recruit ethnically diverse populations, followed by state staff. Categorically, teachers were uncertain about this need. Teachers were the only groups that believed they were doing an adequate job of recruiting ethnically diverse populations.

Teachers also agreed that they were doing an adequate job of recruiting gender-diverse populations. Teacher educators and state staff expressed attitudes that were generally uncertain on this issue.

Both teachers and state staff disagreed with the statement that teachers receive adequate training in recruitment techniques from teacher certification programs. Teacher educators were uncertain in their attitudes toward this component of teacher preparation.

Research Question 3: What were the influences of demographic characteristics (gender, ethnicity, school/community type, region, and years of experience) on attitudes toward student recruitment?

The majority of the respondents were male (84.8%, n = 229) and Caucasian (93.7%, n = 253). Other groups represented were African-American (2.2%, n = 6), Asian American (1.1%, n = 3), Hispanic (1.1%, n = 3), and one person (0.4%) responding as "other." The mean number of years of service was 17.39 with 26.7% (n = 72) reporting

less than ten years of service, 39.6% (n = 107) reporting 11-20 years, 24.4% (n = 66) reporting 21-30 years, and 21.5% (n = 58) reporting more than 30 years.

Demographic information specific to the type of community in which the secondary agricultural education program was located was also collected. The majority were located in large metropolitan (population > 100,000), medium urban areas (population 10,000 - 99,999), small towns (population < 10,000), or rural areas (8.2%, 26.5%, 48.8%, 16.5%, respectively).

Generally, male and female respondents expressed similar attitudes toward recruitment issues. However, some areas of differing attitudes were found (see Table 4).

Table 4: Means and Standard Deviations of Attitudes Toward Recruitment by Gender

Statement	Male	Range*	Female	Range*
All agriculture programs should have an active recruitment plan	4.63 (.69)	Strongly Agree	4.48 (.83)	Agree
Recruitment efforts should be focused on high quality students	3.54 (1.10)	Agree	3.45 (1.03)	Uncertain
Ethnic diversity is important to the success of agriculture programs	3.67 (.97)	Agree	3.42 (1.15)	Uncertain
High school agriculture classes are better suited to male students	1.64 (.68)	Disagree	1.12 (.60)	Strongly Disagree
High school agriculture teachers should be accountable for recruitment of students into their agriculture programs	3.76 (.92)	Agree	3.42 (1.25)	Uncertain
Only students pursuing careers in agriculture should enroll in high school agriculture courses	1.54 (.81)	Disagree	1.36 (.65)	Strongly Disagree

Note. Standard deviations are shown in parentheses. * Strongly Disagree (M = 0-1.49), Disagree (M = 1.50-2.49), Uncertain (M = 2.50-3.49), Agree (M = 3.50-4.49), Strongly Agree (M = 4.50-5.0).

Analyses of variance revealed no significant differences between groups when comparisons were made between respondents of differing ethnic origins, different school/community types, or between respondents based upon years of experience. Differences were identified, however, between respondents' attitudes by region. As noted in Table 5, respondents from Western and Southern regions agreed that agriculture teachers should focus recruitment efforts on high quality students whereas Eastern and Central region teachers were uncertain on this focus. Likewise, Southern respondents were more positive in their beliefs that parents have a positive image of agricultural education and that teachers who recruit should be paid for their efforts. Respondents from the Eastern region strongly disagreed that agriculture classes are better suited to males whereas respondents from the other three regions only disagreed with the statement.

Conclusions/Recommendations

Support of guidance counselors appears to be a problem in the recruitment process. Each group of respondents believed that guidance counselors do not hold positive images of agricultural education. Dyer and Osborne (1994) noted similar perceptions in an Illinois study, but noted that attitudes were more positive if guidance counselors perceived agricultural education to be scientific. Perhaps agricultural educators should promote the scientific nature of agricultural education to guidance counselors.

Table 5: Summary Data and Analysis of Variance of Attitudes by Region

Variable	n	M	SD	F
Agriculture teachers should focus recruitment efforts on high quality students				5.92*
Eastern	43	3.02[a]	1.18	
Central	76	3.41[ab]	1.05	
Western	61	3.62[b]	1.19	
Southern	87	3.83[b]	.94	
Most parents have a positive image of agricultural education				4.02*
Eastern	43	2.65[a]	1.02	
Central	76	3.11[b]	1.03	
Western	61	3.00[ab]	1.00	
Southern	87	3.29[b]	.96	
Teachers who recruit should be paid higher salaries				3.09*
Eastern	43	2.58[a]	1.14	
Central	76	2.78[ab]	1.18	
Western	61	2.95[ab]	1.30	
Southern	87	3.19[b]	1.19	
Agriculture classes are better suited to male students				4.12*
Eastern	43	1.33[a]	1.02	
Central	76	1.54[ab]	.96	
Western	61	1.61[ab]	1.03	
Southern	87	1.77[b]	1.02	

Note. Means with different letter superscripts within categories are significantly different.
* $p < .05$

Teachers are not prepared to assume the role of recruiter. Each group of respondents identified this weakness in teacher certification programs. New courses addressing recruitment issues should be implemented into teacher education programs. Likewise, inservice workshops should be scheduled to train current teachers in recruitment strategies. In addition, state staff should develop programs through which they can support recruitment efforts.

Teachers, teacher educators, and state staff view the image of agricultural education among stakeholders very differently. Teachers generally believe the image to be positive whereas teacher educators and state staff perceive less positive images. Who is right – the teacher who is logically the closest to the situation or the teacher education and state staff members who are farther removed and perhaps less biased in their perceptions? Or, are teachers accurate in their perceptions and teacher educators and state staff out of touch? Better lines of communication should be developed between the groups, and further research to determine why differences exist is warranted.

A diversity issue exists in agricultural education. Respondents in this study were primarily white (93.7%) and male (84.8%). These numbers do not mirror the make-up of the general population. However, agriculture teachers are uncertain if ethnic diversity is important to the success of agriculture programs, and of whether they do an adequate job of recruiting for diversity. By contrast, teacher educators and state staff agree that ethnic diversity is important, but disagree that teachers are doing an adequate job of recruiting for diversity. By contrast, all either agree or strongly agree that gender diversity is important to the success of agricultural education. However, only the teacher group believed they were doing an adequate job in this area. If gender and ethnic diversity are goals of agricultural education

programs, additional training and assistance will likely have to be provided by both teacher education programs and state staff if those goals are to be attained.

Male teachers, teacher educators, and state staff members expressed attitudes generally more positive toward recruitment than did female respondents. However, female respondents expressed more positive attitudes toward recruiting for diversity than did their male counterparts. Teacher educators and state staff should address these differences in courses and/or inservice programs.

Respondents from the Eastern region expressed attitudes generally less favorable toward recruitment and the image of agricultural education than did respondents from other regions of the U.S. Since program numbers in this region have been on a steady decline for the past decade (Camp, et al., 1996), are these attitudes a result of the diminishing numbers of agricultural education programs in this region? Or, is the attrition occurring as a result of the attitudes of the stakeholders? Further research is recommended to identify the influences on respondents' attitudes from all regions and to develop strategies to address these attitudes.

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A Critique By:
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Attitudes of Agriculture Teachers, Teacher Educators, and State Staff Toward Recruitment

This topic is extremely important to the teaching profession and yet at the same time we tend not to devote a great deal of effort towards. So often it is passed on to the other person to be responsible for recruiting. The profession needs to periodically review enrollment figures and attempt to determine if we are fulfilling our mission. Are we making our programs available to those individuals who should be enrolled and could benefit from such enrollment.

The purpose and objectives were clearly stated, methodology clearly presented and appropriate. The survey instrument was designed by the researchers and validity and reliability checks were applied and found to be sufficient.

While it is reported that secondary agricultural education teachers possessed a more positive attitude towards the benefits of the courses offered, one needs to be reminded that the population of secondary instructors for this study was selected from a pool of instructors possessing a favorable disposition towards recruitment and could well have been the group of teachers offering strong programs.

From the results provided it would appear that the state supervisors and teacher educators are viewing recruitment from a distance and encompassing the entire range of programs and instructors within their service area when responding to recruitment efforts.

The topic of recruitment is worthy for in-service education for the classroom teacher. The results indicate areas of concern and could serve as dialogue for teachers focusing on recruitment and enhancing programs to meet the needs of the broadest group of students.

This research has implications for undergraduate agricultural teacher education programs. Most teacher education programs offer training in program management and recruitment of prospective students would be a timely topic.

Attitudes of Star Academy Agriculture Science and Business Students Toward Agriculture

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Introduction

The study reported here presents the findings of the third annual survey on the agricultural science and business students at the STAR (Science and Technology of Agriculture and its Resources) Academy. The STAR Academy was established as an urban agricultural magnet school within the Indianapolis Public Schools system. The STAR Academy began in the 1994-1995 school year with a freshman class of 54 students and one agricultural science and business teacher (J. L. Peters, personal communication, October 1, 1996). In the previous two studies (Talbert, 1996; Talbert, 1997) the freshman class was surveyed in 1995 and the freshman and sophomore classes surveyed in 1996. Talbert (1996) found that gender, minority status, and socio-economic status were not statistically significant factors in enrollment decisions; therefore, recruitment efforts could be single-focused. Talbert (1997) found that enrollment decisions seem to be based on magnet school characteristics and careers related to that magnet. He also found that sophomores were more likely than freshmen to see themselves in a future agricultural career and recommended as much effort should be placed on retention activities as on recruitment. Wardlow, Graham, and Scott (1995) in a qualitative study conducted in a rural community in Arkansas concluded that minority agricultural professionals believed that exposure to careers in high school influenced students' career decisions and that role models of the same ethnicity can also have an influence. One interesting conclusion of this study was that the professionals believed that younger students tended to follow the same academic and career paths as older peers. If this holds true in urban settings, then agricultural magnet schools can be a pipeline for minority agriculture teachers and minority agricultural professionals.

Theoretical Framework

The theoretical framework is based on decision-making models from sociology and psychology. These models provide a base for explaining why people choose to enroll or not enroll in a specific activity such as secondary agricultural education courses. These models also provide a rationale for utilizing ethnicity as a variable and for targeting adolescents as the population.

People make decisions, including enrollment decisions, based on self-characteristics and environmental factors (Herr & Cramer, 1992). Herr and Cramer (1992) summarized the Social Learning Theory of Krumbotz and his associates into four areas: genetic endowment and special abilities, environmental conditions and events, learning experiences, and task approach skills. Ethnicity is a consideration under the genetic endowment and special abilities area; therefore, ethnicity theoretically plays a role in decision-making. Lipsett (1962) stated that people make choices partially based on the factors of social class membership, home influences, school, community, pressure groups, and role perceptions. Each of these influences the decision to join or not join an activity, group, course of study, or occupation. Career development can be divided into life stages and substages (Super, Crites, Hummel, Moser, Overstreet, & Warnath, 1957). In the tentative substage of the exploration stage, ages 15 to 24, adolescents examine career possibilities through fantasy, school classes, and part-time work. Super (1957) concluded that youth perform self-exploration as a result of the environment and situations in the home. He discussed the school as a place that allows for formal exploration of careers through courses, clubs and organizations, and other activities. Therefore, enrollment in an agricultural science and business course can influence later career decisions.

Purpose and Objectives

The purpose of this research was to assess the attitudes toward agriculture of students in an urban agricultural magnet school. The specific objectives of the study were to:

1. Describe selected demographic and situational characteristics of students enrolled in an urban agricultural magnet school.
2. Compare these students by enrollment status, minority status, and gender on the constructs of reasons for enrolling, perceived barriers to enrolling, and personal opinions toward agriculture.

Procedures

The population consisted of all freshman, sophomore, and junior agricultural science and business students in an urban magnet school in a Midwestern state during the Spring Semester, 1997. There were 45 freshman, 41 sophomores, and 42 juniors. Because the population was so small, a census was conducted. Enough questionnaires for all 128 students were mailed to the agriculture teachers with instructions on administering the survey. Following university human subjects procedures, students were told that participation was completely voluntary and anonymous and that they could choose to participate or not to participate. Questionnaires were distributed to all students. Students were instructed to put their blank or completed questionnaires in a collection box, which was closed and delivered to the researcher. All questionnaires were administered and collected on the same day. Because of absences and students self-selecting not to participate, the response rate was 40% for freshman, 63% for sophomores, and 55% for juniors. Students who were absent and who self-selected not to participate may be different than students who participated. However, university human subjects approval procedures did not allow for sampling of non-respondents under these circumstances. The demographics of the respondents are similar to the known population demographics, except for ethnicity in sophomores. The percent of minority respondents for sophomores is lower than the percent of minorities for the sophomore population at STAR Academy.

Students were surveyed using a four-part questionnaire previously used in studies identifying factors influencing minority and nonminority students to enroll in agriculture courses (Talbert & Larke, 1995; Talbert, 1996; Talbert, 1997). Part one consisted of 11 demographic items. Part two, 26 items with a five point Likert-type scale, was designed to discover factors influencing enrollment decisions and used the stem "I would enroll in an agriscience course because...." Part three, 18 items with a five point Likert-type scale, was designed to discover factors which were barriers to enrollment and used the stem "For me, enrolling in an agriscience course is or would be difficult because...." Part four, 17 items with a five point Likert-type scale, was designed to discover perceptions that students held towards agriculture. The original instrument had been pilot tested and reviewed for clarity and content validity. Talbert and Larke, using factor analysis and Cronbach's coefficient alpha, developed scales to measure attitudinal and enrollment constructs. There were eleven scales with a range of Cronbach's alphas from .67 to .86 and with three to 12 items per scale. The scales were grouped into the construct areas of reasons for enrolling, barriers to enrolling, and personal opinions toward agriculture. Students answered individual items using the Likert-type scale 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Therefore, the higher the scale score the greater the student perceived that particular scale as a reason for enrolling, a barrier to enrolling, or more strongly agreed with the personal opinions scale.

The reasons for enrolling scales were called Agriculture, Influential Persons, Disavowance, and Agricultural Career. The Agriculture scale, 12 items, measured the influence of the agriscience course and agriculture in general on the student's decision to enroll. The Influential Persons scale, six items, measured the influence of family members, friends, and school personnel on the decision to enroll. The Disavowance scale, four items, measured the influence on the enrollment decision of those things that the student perceived as out of his/her control such as the counselor placed the student in the course. The Agricultural Career scale, three items, measured the effect of vocational aspects of agricultural education on the enrollment decision.

The barriers to enrolling scales were called Personal Negative, Teacher Negative, Course Negative, and Agriculture Negative. The Personal Negative scale, five items, involved negative interaction with students or influential persons.

The Teacher Negative scale, four items, involved negative interactions with the agriculture teacher. The Course Negative scale, four items, measured the degree of incompatibility between the student and perceived qualities of the course. The Agriculture Negative scale, five items, measured the negative perceptions of the student toward the field of agriculture.

The personal opinions toward agriculture scales were called Personal Career, Agricultural Occupations, and Occupational Requirements. The Personal Career scale, five items, measured the student's attitudes toward his/her entering an agricultural career. The Agricultural Occupations scale, seven items, measured the student's perceptions regarding the variety and scope of the agriculture industry. The Occupational Requirements scale, five items, measured the student's perceptions regarding the requirements needed to obtain a career in agriculture.

Frequencies and percentages are reported for Objective One. For Objective Two, frequencies, means, standard deviations, and ranges are reported. For purposes of interpretation, the following conventions were used when describing means for the scales. Means of 4.5 to 5.0 were described as strongly agree, 3.5 to 4.499 as agree, 2.5 to 3.499 as neutral, 1.5 to 2.499 as disagree, and 1.0 to 1.499 as strongly disagree.

Results

Table 1 shows the demographic characteristics of the population displayed by high school class status. Students were classified as minority if they considered themselves to be Black, Native American, Asian American, or Hispanic and classified as Nonminority if they considered themselves to be White. There were 10 (55.6%) freshman minority students, 6 (23.1%) sophomore minority students, and 11 (47.8%) junior minority students. Of the students classified as minority, 17 considered themselves African-American, 7 as Bi-Racial, and three as Native American. Greater than 60% of the students were female. Almost all of the students were from an urban area or city of more than 50,000 population. For this study, it was assumed that students who received free or reduced lunch had parents or guardians with lower incomes and lower socio-economic status (SES) than students who did not receive free or reduced lunch did. Approximately 50% of all students received free or reduced lunch. Greater than 80 percent of the students had no 4-H experience. One-third of the freshmen planned to enter an agricultural career upon high school or college graduation and almost 28% planned to enter such a career within their working career. Greater than 30% of the sophomores planned to enter an agricultural career upon high school or college graduation and around 38% planned to enter such a career within their working career. One-fourth of the junior class planned to enter an agricultural career upon high school or college graduation and around 30% planned to enter such a career within their working career.

Tables 2 through 4 show the scales by high school class status. The first four scales in all three tables measured reasons for enrolling in an agriculture class. All three groups were neutral that the construct represented by the Agriculture scale was a reason for enrolling in an agriculture class. The freshman and junior groups agreed that the construct represented by the Agricultural Career scale was a reason for enrolling in an agriculture class while the sophomores were neutral. All three groups were neutral that the Disavowance construct was a reason for enrolling. The freshman class was neutral that Influential Persons were a reason for enrolling. The sophomores and juniors disagreed in this area. For three of the reasons for enrolling scales freshmen had the highest means; juniors had the highest means for the Disavowance scale.

The next four scales in Tables 2 through 4 measured barriers to enrolling in an agriculture class. Freshmen, sophomores, and juniors disagreed or were neutral with all four scales. For freshmen the highest mean (2.14) was for the Agriculture Negative scale and the lowest mean (1.78) was for the Teacher Negative scale. For sophomores the highest mean (2.71) was for the Personal Negative scale and the lowest mean (2.37) was for the Agriculture Negative scale. The juniors' highest mean (2.23) was for Teacher Negative and the lowest mean (1.93) was for the Agriculture Negative scale. For all four scales, freshman had lower means (indicating less perceived barriers) than both sophomores and juniors.

Table 1: Demographic Characteristics by High School Class Status

Characteristic	Freshman		Sophomore		Junior	
	n [a]	%	n [a]	%	n [a]	%
Ethnicity						
Minority	10	55.6	6	23.1	11	47.8
Nonminority	8	44.4	18	69.2	12	52.2
Did not answer	0	0.0	2	7.7	0	0.0
Gender						
Female	11	61.1	18	69.2	14	60.9
Male	7	38.9	8	30.8	8	34.8
Did not answer	0	0.0	0	0.0	1	4.3
Location Where Live						
Farm	0	0.0	2	7.7	0	0.0
Rural	1	5.6	0	0.0	0	0.0
Suburb	0	0.0	0	0.0	0	0.0
City	17	94.4	24	92.3	23	100
Did not answer						
Receive Free/Reduced Lunch						
Yes	11	61.1	12	46.2	12	52.2
No	7	38.9	14	53.8	11	47.8
Membership in 4-H						
Yes	4	22.2	4	15.4	0	0.0
No	14	77.8	21	80.8	23	100
Did not answer	0	0.0	1	3.8	0	0.0
Immediate Ag Career Plans						
Yes [b]	6	33.4	8	30.7	6	26.0
No	4	22.3	9	34.6	5	21.7
Unsure	8	44.4	9	34.6	12	52.2
Lifetime Ag Career Plans						
Yes [b]	5	27.8	10	38.5	7	30.4
No	2	11.1	11	42.3	4	17.4
Unsure	11	61.1	5	19.2	12	52.2

[a] n = those respondents who answered that item

[b] The categories of Probably Yes and Definitely Yes and the categories of Probably No and Definitely No were combined for reporting purposes in this table.

The last three scales in Tables 2 through 4 measured personal opinions toward agriculture. For all three scales freshmen, sophomores, and juniors agreed with the constructs. The Agricultural Occupations scale had the highest mean for all groups.

Table 5 shows the scales by minority status. The first four scales in the table measured reasons for enrolling in an agriculture class. Both minority and nonminority groups were neutral that the construct represented by the Agriculture scale was a reason for enrolling in an agriculture class. Both minority and nonminority groups agreed that the construct represented by the Agricultural Career scale was a reason for enrolling in an agriculture class. Both

groups were neutral that the Disavowance construct was a reason for enrolling. Minority students were neutral and Nonminority students disagreed that the Influential Persons construct was a reason for enrolling.

Table 2: Reasons for Enrolling, Barriers to Enrolling, and Personal Opinions toward Agriculture Scales by Freshman Class

Scale	n[a]	mean	s.d.	range
Agriculture	16	3.49	.65	2.08-4.67
Agricultural Career	18	4.09	1.00	1.00-5.00
Disavowance	18	2.58	.63	1.00-3.50
Influential Persons	17	2.88	.87	1.00-4.67
Course Negative	18	2.08	.92	1.00-3.75
Personal Negative	17	2.02	.95	1.00-4.60
Agriculture Negative	18	2.14	1.10	1.00-5.00
Teacher Negative	17	1.78	.78	1.00-3.25
Ag. Occupations	17	4.18	.81	2.29-5.00
Occupational Req.	18	3.52	.67	2.40-4.60
Personal Career	18	3.63	.73	2.20-4.60

[a] n = those respondents who answered all items comprising the scale

Table 3: Reasons for Enrolling, Barriers to Enrolling, and Personal Opinions toward Agriculture Scales by Sophomore Class

Scale	n[a]	mean	s.d.	range
Agriculture	25	2.88	1.02	1.00-4.92
Agricultural Career	26	3.26	1.41	1.00-5.00
Disavowance	26	2.69	.89	1.00-4.00
Influential Persons	26	2.37	.95	1.00-5.00
Course Negative	23	2.58	1.22	1.00-5.00
Personal Negative	26	2.71	1.05	1.00-5.00
Agriculture Negative	25	2.37	1.10	1.00-5.00
Teacher Negative	26	2.51	1.37	1.00-5.00
Ag. Occupations	24	3.78	1.15	1.00-5.00
Occupational Req.	24	3.52	1.06	1.00-5.00
Personal Career	25	3.32	1.11	1.00-5.00

[a] n = those respondents who answered all items comprising the scale

Table 4: Reasons for Enrolling, Barriers to Enrolling, and Personal Opinions toward Agriculture Scales by Junior Class

Scale	n[a]	mean	s.d.	range
Agriculture	23	3.21	.42	2.17-4.00
Agricultural Career	22	3.62	.97	1.33-5.00
Disavowance	22	2.90	.71	1.25-4.50
Influential Persons	23	2.28	1.04	1.00-4.33
Course Negative	22	2.16	.89	1.00-4.50
Personal Negative	22	2.16	.78	1.00-3.40
Agriculture Negative	22	1.93	.82	1.00-3.80
Teacher Negative	23	2.23	1.24	1.00-4.75
Ag. Occupations	20	4.03	.57	3.00-5.00
Occupational Req.	21	3.72	.47	3.00-4.80
Personal Career	20	3.80	.81	1.20-5.00

[a] n = those respondents who answered all items comprising the scale

The next four scales in Table 5 measured barriers to enrolling in an agriculture class. Minority and Nonminority students disagreed with all four scales. For Minority students the highest mean (2.37) was for the Course Negative scale and the lowest mean (2.21) was for the Teacher Negative scale. For Nonminority students the highest mean (2.43) was for the Personal Negative scale and the lowest mean (2.05) was for the Agriculture Negative scale.

The last three scales in Table 5 measured personal opinions toward agriculture. For all three scales both Minority and Nonminority students agreed with the constructs. The Agricultural Occupations scale had the highest mean for both groups.

Table 5: Reasons for Enrolling, Barriers to Enrolling, and Personal Opinions toward Agriculture Scales by Minority Status

	Minority				Nonminority			
Scale	n[a]	mean	s.d.	range	n[a]	mean	s.d.	range
Agriculture	27	3.23	.71	1.50-4.67	37	3.09	.84	1.00-4.92
Agricultural Career	29	3.84	1.14	1.00-5.00	37	3.42	1.23	1.00-5.00
Disavowance	29	2.91	.71	1.00-4.50	37	2.59	.79	1.00-3.75
Influential Persons	28	2.65	1.11	1.00-5.00	38	2.33	.85	1.00-3.83
Course Negative	28	2.37	1.03	1.00-5.00	35	2.23	1.06	1.00-5.00
Personal Negative	28	2.24	.91	1.00-5.00	37	2.43	1.02	1.00-5.00
Agriculture Negative	29	2.29	1.08	1.00-5.00	36	2.05	.96	1.00-5.00
Teacher Negative	28	2.21	1.34	1.00-5.00	38	2.23	1.14	1.00-5.00
Ag. Occupations	26	3.87	.82	1.00-5.00	35	4.05	.96	1.00-5.00
Occupational Req.	28	3.53	.80	1.00-4.80	35	3.63	.79	1.00-5.00
Personal Career	28	3.62	.97	1.00-4.80	35	3.51	.91	1.00-5.00

[a] n = those respondents who answered all items comprising the scale

Table 6 shows the scales by gender. The first four scales measured reasons for enrolling in an agriculture class. Both males and females were neutral that the construct represented by the Agriculture scale was a reason for enrolling in an agriculture class. Males were neutral that the construct represented by the Agricultural Career scale was a reason for enrolling in an agriculture class while females agreed. Both groups were neutral that the Disavowance construct was a reason for enrolling. Females disagreed that Influential Persons were a reason for enrolling while males were neutral.

The next four scales in Table 6 measured barriers to enrolling in an agriculture class. Males and females disagreed that these were barriers to enrollment in an agriculture class. For males the highest mean (2.43) was for the Personal Negative scale and the lowest mean (2.20) was for the Agriculture Negative scale. For females the highest mean (2.30) was for the Course Negative scale and the lowest mean (2.11) was for the Teacher Negative scale. For all four scales, females had lower means (indicating less perceived barriers) than males.

The last three scales in Table 6 measured personal opinions toward agriculture. Males and females agreed with the constructs. The Agricultural Occupations scale had the highest mean for both groups.

Table 6: Reasons for Enrolling, Barriers to Enrolling, and Personal Opinions toward Agriculture Scales by Gender

	Male				Female			
Scale	n[a]	mean	s.d.	range	n[a]	mean	s.d.	range
Agriculture	22	3.18	.77	1.50-4.92	41	3.12	.81	1.00-4.67
Agricultural Career	23	3.48	1.28	1.00-5.00	42	3.65	1.17	1.00-5.00
Disavowance	23	2.79	.76	1.00-4.00	43	2.68	.78	1.00-4.50
Influential Persons	23	2.62	1.01	1.00-5.00	42	2.35	.95	1.00-4.67
Course Negative	21	2.29	1.12	1.00-5.00	41	2.30	1.02	1.00-5.00
Personal Negative	23	2.43	.99	1.00-5.00	41	2.28	.97	1.00-5.00
Agriculture Negative	23	2.20	1.16	1.00-5.00	41	2.14	.96	1.00-5.00
Teacher Negative	23	2.42	1.38	1.00-5.00	42	2.11	1.13	1.00-5.00
Ag. Occupations	20	3.92	1.05	1.00-5.00	40	3.99	.85	1.00-5.00
Occupational Req.	22	3.54	.93	1.00-4.80	40	3.61	.72	1.00-5.00
Personal Career	23	3.43	1.03	1.00-4.80	40	3.64	.87	1.00-5.00

[a] n = those respondents who answered all items comprising the scale

Conclusions

The population studied was diverse in gender, ethnicity, and SES, while almost all of the students were from an urban environment with little prior agricultural experience. Despite their non-agricultural backgrounds, one-third of the freshmen and sophomores and one-fourth of the juniors indicated that they saw themselves in an agricultural career after graduation while one-third of the freshmen, sophomores, and juniors saw themselves in an agricultural career sometime within their lifetime. In both instances a higher percentage of sophomores had agricultural career plans than freshmen and juniors. It can be concluded that urban agricultural magnet schools can attract students from diverse populations who may enter an agricultural career.

Freshmen, sophomore, and junior students were more likely to enroll because of Agricultural Career reasons than Agriculture, Influential Persons, or Disavowance reasons. No group perceived the four barriers constructs as reasons not to enroll in an agriculture class. The groups had favorable perceptions regarding agriculture and had the strongest agreement about the diversity of agricultural occupations. From this it can be concluded that this particular urban

magnet school is incorporating instruction about a wide variety of agricultural occupations and is successfully using agricultural careers as a recruitment tool.

Both minority and nonminority students were more likely to enroll because of Agricultural Career reasons than Agriculture, Influential Persons, or Disavowance reasons. Neither group perceived the four barriers constructs as reasons not to enroll in an agriculture class. Both groups had favorable perceptions regarding agriculture and had the strongest agreement about the diversity of agricultural occupations. In this urban agricultural magnet school with these students there does not seem to be a difference between minority and nonminority students in enrollment decisions and attitudes towards agriculture.

Both males and females were more likely to enroll because of Agricultural Career reasons than Agriculture, Influential Persons, or Disavowance reasons. Neither group perceived the four barriers constructs as reasons not to enroll in an agriculture class. Both groups had favorable perceptions regarding agriculture and had the strongest agreement about the diversity of agricultural occupations. In this urban agricultural magnet school with these students there does not seem to be a difference between males and females students in enrollment decisions and attitudes towards agriculture.

Recommendations/Implications

Students in an urban agricultural magnet school, whether looked at by class, minority status, or gender, see careers as important to the enrollment decision and have the strongest agreement that careers in agriculture are diverse. This supports the findings of Talbert's earlier studies (1996, 1997). Therefore urban agricultural magnet schools should emphasize career opportunities in both recruitment and retention efforts while at the same time emphasizing agricultural careers as a topic area during classroom instruction.

Sophomores were more likely to see themselves in an agricultural career than freshmen and juniors. Talbert (1997) found that sophomores (now juniors) more than freshman (now sophomores) saw themselves in an agricultural career, which means that the two classes reversed order. Is this an effect of the sophomore curriculum, the growth-maturity process, or another factor?

Influential Persons was not an important reason for enrolling for any of the groups. Because the STAR Academy had only been in existence for three years and because it is located in an urban area, peers, parents, and siblings may not exert as great an influence as would be expected. An implication for this study and supported by Wardlow et al. (1995) is that these first STAR students are critical in laying the foundation for future recruitment, publicity, and public relations efforts.

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A Critique By:
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Attitudes of Star Academy Science and Business Students Toward Agriculture

A preliminary investigation in a new and emerging field.

Building that all important data base is valuable Many times we start a project or implement a concept and neglect to collect the data to support or analyze the effort at a later date

The purposes and objectives were very specific and the study could be replicated in a number of settings.

The population was small and the entire population was surveyed minus the non-respondents.

The procedures appeared to be appropriate for the study and the methodology was appropriate for this study. It should be noted that sampling of non-respondents (absent students and students self-selecting not to participate in the study) to determine differences in respondents was not permitted under university policy.

In the discussion of Table 5 which listed barriers to enrolling, it was reported that students disagreed with all four scales. The discussant interprets the results as the students not having the same ranking for barriers to enrollment.

The analysis of the data collected and the purposes and objectives of the study are in agreement. For the purposes and the objectives of this study, the analysis appears appropriate.

There is information contained in the report that administrators and/or teachers may want to further analyze. If enrollment drops, declines or it is determined that enrollment is not what it should be given the scope of a program, administrators and teachers may desire to further analyze specific responses and design recruiting materials to counter the negative factors.

The profession realizes that this program is in its infancy. The data collected over the years will be valuable as the program grows and changes are made in the program.

A Comparison of Stakeholder Beliefs Concerning the Farm Safety Training Needs of Youth

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An estimated 27,000 children under the age of 20 years who live on farms and ranches are injured in farm accidents each year. This figure does not include children who visit or work on non-family farms. The total injury toll has been estimated at greater than 100,000 annually (National Farm Medicine Center, 1996). Considering that secondary agricultural education programs have over 700,000 students enrolled per year, what specific agricultural and farm safety topics should agricultural educators teach in order to lower the the number of farm injuries experienced by youth? Many of the recommendations from earlier research completed in the profession have applicability in farm settings. For example, recommendations by Lawver and Fraze (1995), Swan (1993), and Miller (1995) have informed the teaching practices of teachers in agricultural mechanics laboratories about student attitudes concerning safety and the effects of exposure to magnetic fields. However, there remains a limited amount of knowledge concerning what stakeholders, other than researchers or teacher educators, desire in farm safety instruction for youth.

In order to determine the content of instructional programming, one must be aware of the context of youth in agriculture as well as the nature and magnitude of injuries experienced by youth across the United States. Unlike other industries, children make up a significant portion of the work force in agriculture. Children less than 16 years of age are barred from working in other types of industry, but under the Fair Labor Standards Act-Child Labor Bulletin No. 102 of 1984, twelve and thirteen year old children may be employed on any farm with the consent of a parent. Children of any age may be employed by their parent in any occupation on a farm owned or operated by their parent in accordance with Child Labor Bulletin No. 102 (Swanson, Sachs, Dahlgren, and Tinguely, 1987).

Economic conditions on the farm and ranch encourage the use of children as laborers to "make ends meet." Children may be unsupervised and have responsibility for caring for livestock much larger and stronger than themselves; for heavy or complex equipment that they may be too young or too small to safely operate; and for being around other potential hazards such as harmful chemicals, faulty construction or where dangerous storage areas exist. Health providers have documented children working more than 60 hours per week, with some working 80 or more hours (Pollack, McDonnell, Galilee, Schmidt, Oregon, and Landrigan, 1990). Economic conditions often place youth in hazardous situations that often lead to serious injuries and sometimes to death.

Findings from Minnesota and Indiana studies indicated that 24% and 14%, respectively, of total fatal farm injuries were sustained by children 15 years of age or younger (Aherin, Murphy, and Westby, 1992). Findings from a study of fatal farm-related injuries to children 9 years of age and under in Wisconsin and Illinois from 1979 to 1985 indicated that average annual death rates in the study population were 3.2 per 100,000 workers in Wisconsin and 1.5 per 100,000 workers in Illinois (Runyan, 1993). In addition, The National Coalition for Agricultural Safety and Health (1989) reported that of the approximately 1,600 agricultural deaths reported in 1986, another 300 farm-related deaths were not included. These deaths were children involved in farm-related activities. Fortunately, most youth involved in farm accidents experience non-fatal injuries. Knowledge of the causes and nature of the accidents can assist in the design of age-appropriate agricultural health and safety instructional materials.

Some of the most traumatic injuries occur during interactions with machinery, especially tractors (Bean, 1991). Tractor accidents have been identified as the leading cause of deaths and disabling injuries on farms (Runyan, 1993). Tractors are the most frequent cause of fatal farm accidents (one-third to one-half) but account for a much smaller

percentage (5 to 10 percent) of nonfatal farm accidents, according to Murphy (1992). Overturns account for about one-half and run overs account for about one-fourth of the accidents (Murphy, 1992). In a hospital study that spanned six and one-half years and focused on 105 children, Cogbill, Busch, and Stier (1985) found that animals were involved in 40% of the injuries (32% horses, 8% cows). The National Safety Council (1992) ranked beef cattle farms second among all farming operations in injuries per hours of work. Horses are often the cause of many injuries experienced in work and pleasure settings. The National Electronic Injury Surveillance System Summary (1995) reported 139,765 equestrian injuries in the United States for 1993 and 1994.

In a recent study of data obtained from five years of emergency room logs, Joerger and Sommers (1997) found that livestock, rural-based agents of injury, and machinery accounted for 56.8% (2,141), 29.2% (1,101) , and 13.9% (524), respectively, of the agricultural injuries treated in rural Utah hospital emergency rooms. Horses were the cause of 46.8% of all farm injuries. They also found children of age 16 years and younger experienced 29.8% (1,125) of all agriculturally-related injuries treated in rural hospital emergency rooms. Children ages 0-16 years experienced 28.2% of the livestock injuries, 34.2% of the machinery injuries, and 30.9% of the rural-based injuries. Horses were the primary cause of 44.5% of the livestock injuries experienced by the youth. They found tractors were the primary cause of 33.3% of the machinery injuries. Fences and fencing activities were the foremost causes of 48.8% of the listed rural-based injuries. Individuals from 9-16 years of age experienced more bruises, cuts, and fractures than any other age group.

Findings from the North Dakota agricultural injury surveillance system for 1991-1994 indicate 11% of 4,685 agricultural-related injuries involved youth 10-19 years of age while 4% involved children less than 10 years of age (Gilmore and Shireley, 1996). Silletto and Hull (1988) reported 10 to14 year old youth experienced a much larger accident rate per hour of tractor use than any other age group with 43 accidents per million hours of use. In addition to the high accident rate of young tractor operators, research shows that young extra tractor riders have been involved in the most fatalities. Eighty-nine percent of all tractor fatalities occurred to persons 1-15 years old (Silletto and Hull, 1988). Sheldon (1992) reported that 27 cases of children under the age of eighteen were entrapped or suffocated in flowing grain in storage facilities and transport vehicles in Indiana and Wisconsin from 1970-1990. Sixty percent of these cases involved children in the 6-11 age group.

A two-year investigation of data recorded in emergency department logs at Marshfield Clinic/St. Joseph's Hospital in central Wisconsin revealed that 27% of the agricultural injuries treated in the emergency room were for individuals less than 18 years of age. Over half of the injuries involved machinery; the other half were from animals, falls, and exposure (Stueland, Soch, Stamas, Krieg, and Boulet, 1990).

Findings from a six and one-half year study of 105 children admitted to the hospital due to farm-related traumas indicated that 40% of the injuries were related to animals, 26% to tractor or wagon accidents, 20% to farm machinery, 6% from falls off farm buildings, and 8% from miscellaneous causes (Cogbill et al., 1985). Findings from a study completed by St. Mary's Hospital of Rochester, Minnesota revealed that 62.5%, 34.1%, and 14.8% of the injuries were fractures, lacerations, and amputations, respectively. The tractor and power take off (PTO) were the primary causes of the agricultural injuries investigated in this study (Swanson et al., 1987).

The findings from these studies indicate children appear to sustain a large proportion of injuries from livestock, tractors and machinery, and rural-based agents such as irrigation canals, equipment, and fencing activities. In addition to the administration of laws, regulations, and policies, education and persuasion of individuals has continued to be one of the more viable strategies for controlling the number of injuries and (Aherin, Murphy, and Westaby, 1992). Planners of farm safety programming know the importance of basing agricultural health and safety instruction on a sound body of research, anecdotal evidence, and input from stakeholders who influence and participate in the training programs.

Purposes and Objectives

The purpose of this study was to examine the nature of the beliefs of selected stakeholders concerning the content for agricultural safety instruction for Utah youth. The objectives that guided this study were to compare the beliefs of selected stakeholder groups concerning which agricultural health and safety topics should be taught to youth relating to:

1. livestock,
2. machinery and facilities, and
3. rural-based injuries.

Procedures

Participants for this descriptive study were purposefully selected subjects. The populations for the study included 150 (36.1%) farmers and ranchers, 36 (8.7%) secondary agricultural education teachers, 16 (3.9%) preservice agricultural education teachers, 85 (20.5%) non-farm students and 128 (30.8%) farm students in grades 9-12 enrolled in secondary agricultural education programs from ten secondary agricultural education programs.

A questionnaire was developed and field tested by the authors to collect participant data. The questions were based upon research findings of Joerger & Sommers (1997) and Aherin, Murphy, and Westaby (1992). The questionnaire was comprised of three sections. In the first two sections participants were instructed to indicate their level of agreement concerning agricultural health and safety topics of instruction for youth ages five to sixteen years and adults by circling the appropriate response from the adjoining Likert-like scale. The scale consisted of the following: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1, No Information = 0. The third section of the questionnaire requested demographic data from the participants. The face and construct validity of the instrument was established by a panel of experts familiar with agricultural health and safety education and research issues. The Cronbach's alpha reliability coefficients for section one and two were .93 and .97, respectively.

The questionnaire was administered by the authors, project assistants, and pre-service agricultural education student teachers. Data from the 150 farmers and ranchers were collected at a Farm Bureau state committee meeting and at the annual Farm Bureau Convention. Data from the 36 secondary agricultural education teachers were collected by sending questionnaires through the mail and following up with post cards and telephone calls as prescribed by the Dillman survey method. Questionnaires were administered to the 16 preservice agricultural teachers during a pre-service agricultural education course. Student teachers administered the questionnaire to 85 secondary students from non-farming backgrounds and 128 students with farming backgrounds who were enrolled in ten agriscience and technology programs.

The data were analyzed using SPSS/PC+ (Norusis, 1994). Descriptive parameters were calculated for each question for each group of participants. A grand mean and standard deviation were calculated for each question for all participants when combined into one large group. One-way Analysis of Variance procedures were used to examine the differences between the means of the groups. Least Significant Difference (LSD) post hoc analysis procedures were used to detect differences between group means. An alpha level of .05 was established a priori. The findings from this study cannot to be generalized to other populations of farmers and ranchers, agricultural teachers, preservice agricultural teachers, or secondary students enrolled in agricultural education courses due to the purposeful process used for selecting the participants.

Findings

Objective 1: Compare the beliefs of selected stakeholder groups concerning which agricultural health and safety topics associated with livestock should be taught to youth.

The data in column two of Table 1 indicate the participants agreed youth should receive instruction in the use of safe practices when working around and with horses, beef cattle, and dairy cattle. The groups disagreed there was a need

for instruction relating to the use of safe practices when working with and around swine, sheep, poultry, and exotic livestock and fish.

The data from the individual groups of participants suggest the agricultural teachers and pre-service agriculture teachers indicated a significantly stronger level of agreement for the need for safety education for livestock than farmers and students enrolled in agriscience and technology classes who lived in farm and non-farm residences. They either strongly agreed or agreed that youth should receive safety instruction relating to the care and handling of all types of livestock. The mean scores of the farmers indicate they disagreed there was a need for safety instruction for youth relating to the care and handling of swine, sheep, poultry, and the exotic livestock and fish for youth. Non-farm students agreed there was only a need for instruction in the safe handling of horses. Farm students agreed there was a need for instruction in the safe handling of horses, beef cattle, sheep and exotic livestock and fish.

Table 1: Comparison of Means of Stakeholder Beliefs Concerning the Livestock Safety Training Needs of Youth

		Stakeholder Groups					
Safety Topics	Mean (n=450)	Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	F Value
Horses	2.92[3]	2.92 [1a]	3.77 [a b]	3.56 [a c]	2.76 [b c]	2.70 [b c]	7.75*
	1.17	1.17[2]	.42	1	1.23	1.17	
Beef Cattle	2.68	2.63 [a]	3.37 [ade]	3.38 [ade]	2.46 [b cd]	2.61 [bc e]	5.29*
	1.21	1.31	.54	.99	1.24	1.12	
Dairy Cattle	2.62	2.50 [a b]	3.26 [a]	3.25 [a c]	2.47 [b c]	2.40 [bc]	4.33*
	1.21	1.34	.55	.97	1.25	1.03	
Swine	2.43	2.23 [a]	3.06 [a b]	3.13 [a c]	2.32 [b c]	2.48 [b c]	4.97*
	1.23	1.40	.71	.99	1.20	1.08	
Sheep	2.41	2.31 [a]	2.91 [a b]	3.00 [a c]	2.29 [b c]	2.60 [b c]	3.11*
	1.23	1.36	.91	.94	1.17	1.10	
Exotic Animals & Fish	2.30	1.84 [a b]	2.67 [a b]	2.63	2.36	2.68 [a]	3.71*
	1.05	1.46	.80	.86	1.28	.87	
Poultry	2.15	1.91 [a]	2.62 [a]	2.56 [a]	2.25 [a]	2.21 [a]	3.43*
	1.23	1.40	.87	.86	1.18	1.10	
Mean	2.50						
SD	.23						

Notes: [1]Mean [2]Standard Deviation

[3]Scale: No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1

[a,b,c,d,e] Like superscripts among means of participant groups indicate significant differences.

* $p <= .05$.

Objective 2: ***Compare the beliefs of selected stakeholder groups concerning which agricultural health and safety topics associated with machinery and facilities should be taught to youth.***

The data in column two of Table 2 indicate the respondents as a combined group strongly agreed or agreed youth should receive instruction in the use of safe practices when working around and with tractors, machinery, electricity, power-take-offs, all terrain vehicles, agricultural facilities, grain bins and silos, and augers and elevators. However, the data indicate there were significant differences in the levels of agreement regarding the need for safety training between the groups with one exception; all groups strongly agreed youth should receive instruction for safely operating tractors. The mean scores of the farmers and agricultural and preservice agriculture teachers reflect they strongly agreed youth should receive instruction in the use of safe practices when operating and working around tractors, machinery, electricity, power-take-off shafts, all terrain vehicles, and augers and elevators. Pre-service and agricultural educators strongly agreed youth should receive instruction in grain bin and silo safety. The farmers, farm students,

and agricultural and pre-service educators agreed youth need instruction in the use of safe practices when working with and around and agricultural facilities.

Table 2: Comparison of the Means of the Beliefs of Stakeholder Concerning the Machinery and Facilities Safety Training Needs of Youth

Safety Topics	Mean (n=450)	Stakeholder Groups: Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	F Value
Tractors & Safe	3.60[3]	3.69[1]	3.91	4.0	3.55	3.38	1.14
Tractor Driving	1.73	.68[2]	.37	0	3.55	.90	
Machinery	3.57	3.66	3.89	3.94	3.30	3.50	5.28*
	.81	.79	.40	.24	1.07	.70	
Electrical Safety	3.47	3.52[a]	3.86[b]	3.88[c]	3.27[abc]	3.36[abc]	47.38*
	.87	.86	.35	.33	1.01	.87	
Power Take Off	3.45	3.67[a]	3.91[b]	3.94[c]	3.01[abcd]	2.34[abcd]	11.68*
(PTO)	..96	.82	.37	.24	1.11	1.40	
Augers &	3.39	3.51[d]	3.83[b]	3.94[c]	3.13[abcd]	3.22[abcd]	5.79*
Elevators	1.02	1.05	.45	.24	1.14	.99	
ATV's	3.28	3.59[a]	3.80[b]	3.81[c]	2.80[abc]	3.03[abc]	14.40*
	1.06	.91	.40	.39	1.28	1.03	
Grain Bins &	3.15	3.33[a]	3.6[b]	3.88[a]	2.80[a b]	2.96[a b]	8.61*
Silos	1.05	1.07	.55	.33	1.14	.99	
Facilities	2.81	2.83[a]	3.43[a b]	3.19	2.4[b]	2.71[b]	4.07*
Safety	1.15	1.20	.55	.95	1.26	1.10	
Mean	3.34						
SD	.22						

Note: [1]Mean [2]Standard Deviation

[3]Scale No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1

[a,b,c,d,e] Like superscripts among means of participant groups indicate significant differences.

* $p <= .05$.

Objective 3: ***Compare the beliefs of selected stakeholder groups concerning which agricultural health and safety topics associated with rural-based injuries should be taught to youth.***

The data in column two of Table 3 indicate the participants agreed youth should receive instruction in safe practice when working with and around pesticides, irrigation equipment and canals, and while stacking hay and constructing and repairing fences. The mean scores of each group of participants indicate they agreed or strongly agreed youth should receive instruction in the use of safe practices for fencing, stacking hay, pesticides, and when working with and around irrigation equipment and canals. However, the data in Table 3 further show the agricultural educators and pre-service agricultural educators indicated a significantly stronger belief than the farmers, and secondary students from farm and non-farm backgrounds that these topics of instruction should be taught to youth ages 5 to 16 years.

Further analysis of the means of the combined scores in Tables 1, 2, and 3 indicate by category the participants in the study believed educators should place emphasis, in order, on machinery and facilities (x 3.34, SD .22); rural-based sources of injury (x 3.04 SD .17); and livestock safety topics (x 2.50 SD .23) when delivering farm safety programming for youth.

Table 3: Comparison of the Means of the Beliefs of Stakeholders Concerning the Rural-based Agricultural Injury Safety Training Needs of Youth

Safety Topics	Mean (n=450)	Stakeholder Groups: Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	F Value
Pesticides	3.20[1]	3.39[a]	3.80[a]	3.81[b]	2.77[a b]	3.02[a b]	10.64*
	1.06[2]	.98	.47	.39	1.24	1.16	
Irrigation & Canal Safety	3.15[3]	3.42[a]	3.49[c]	3.5[d]	2.80[abd]	2.92[abd]	8.28*
	1.05	.91	.55	1.0	1.28	1.02	
Stacking Hay	3.03	3.23[a]	3.57[b]	3.69[c]	2.67[abc]	2.79[abc]	9.32*
	1.09	1.15	.55	.46	1.16	.99	
Fencing	2.77	2.77[a]	3.23[a b]	3.44[a c]	2.53[b c]	2.72[b c]	4.29*
	1.09	1.20	.59	.61	1.13	.99	
Mean	3.04						
SD	.17						

Note: [1]Mean [2]Standard Deviation

[3]Scale: No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1

[a,b,c,d,e] Like superscripts among means of participant groups indicate significant differences.

* $p <= .05$

Conclusions

The farmers, secondary pre-service and practicing agricultural educators, and secondary student participant groups in this study believe youth should receive farm safety education from the machinery and facilities, rural-based hazards, and livestock categories. This prioritization mirrors the order and percentage of injuries reported by Joerger and Sommers (1997). They found children ages 0-16 years experienced 34.2% of the machinery injuries, 30.9% of the rural-based injuries, and 28.2% of the livestock injuries. Likewise, Cogbill et. al. (1985) reported that 52% of youth injuries were caused by tractors, machinery, and facilities and 40% were caused by livestock.

The stakeholder groups believed there was a need for instruction in farm safety topics within each of the major categories. Within the livestock category, the stakeholders as a group agreed or strongly agreed youth should receive instruction in proper use of safe practices when working with and around horses, dairy cattle and beef cattle. The machinery and facilities safety topics they strongly or agreed should be taught were tractor, machinery, electrical, pto, augers and elevators, ATVs, grain bins and silos, and facilities safety. Farm safety education topics within the rural-based category that stakeholders agreed should be taught were pesticides, fencing, stacking hay, and irrigation and canal safety.

Stakeholder groups differed in their levels of belief concerning the need to teach the youth different farm safety education topics within each category. Other than for farm safety topics within the machinery and facilities category, pre-service and practicing secondary agriculture teachers placed the greatest importance of all stakeholder groups on the need for teaching farm safety topics to youth. This may be due in part to the fact that most teachers have experienced greater exposure to farm safety research studies and the instructional materials provided by various vendors. Anecdotal evidence also suggests change agents who have seen or experienced farm injuries, such as agriculture teachers, carry a heightened sense of awareness and need for providing farm safety education to youth. Safety is promoted in all courses throughout the pre-service preparation and during in-service programs for the agricultural educators.

Secondary students with farm and non-farm backgrounds consistently indicated the lowest priority for teaching farm safety topics to youth. Their mean scores may reflect their lack of exposure to hazards in farm and ranch settings, farm safety education programming, or the belief they are invulnerable and "bullet proof.". As a result, it is important for teachers of farm safety topics to carefully choose age-appropriate instructional strategies.

Recommendations

The findings and conclusions of this study led the authors to forward several recommendations for practice and research. First, Utah and southern Idaho educators should involve members of these stakeholder populations when selecting topics for farm safety education programs. This study indicates their opinions reflect accurate knowledge of the nature and number of farm injuries being experienced by youth. Second, farm safety education programs should prioritize programming to reflect stakeholder beliefs and research findings that indicate emphasis should be placed, in order, on machinery, rural-based, and livestock safety topics. Third, secondary students from farm and non-farm backgrounds who are enrolled in secondary agriculture classes need additional instruction in farm safety topics to heighten their awareness and concern for the safety hazards that exist on farms and ranches. Fourth, farm safety educators need to select, design, and/or be provided with quality age-appropriate farm safety instructional materials and teaching strategies.

Several ideas for related research are offered as a result of completing this study. Researchers need to investigate the barriers that prevent, and factors that lead to the adoption and use of safe practices by different age groups of children and adults who work in farm and ranch settings. Still unknown is the nature and amount of farm safety programming actually being delivered to youth by the agricultural teachers. From a related and programmatic perspective, researchers need to identify the number and nature of agricultural injuries of adults along with the perceived farm safety instructional needs of the adults. Appropriate comparisons with the farm safety education needs of youth can then be determined.

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A Critique By:
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A Comparison of Stake Holder Beliefs Concerning the Farm Safety Training Needs of Youth

Our profession has a responsibility to inform the general public and instruct youth in the hazards associated with rural life.

A very important study. With the Agricultural Mechanics teacher educators not meeting as a section at this conference, there appears to be fewer studies shared on the topic of safety and this study helps in filling the apparent void.

The review of literature was complete and appropriate.

The population was purposely selected. The survey questionnaire was developed by the author based on research findings and validity and reliability checks conducted. The authors were correct in stating that the findings could not be applied to other populations.

It is not surprising that the students who responded to the survey did not place a great deal of importance on the value of instruction in aspects of rural safety. The discussant agrees with the researcher when they acknowledged that fact by explaining the concept that students feel invulnerable.

Does the information collected on farm accidents contain sufficient details to enable educators to be able to make specific curriculum recommendations. The author did not take this study to the degree of specifying specific curriculum content. This could well be the purpose of further research. The necessary information to warrant efforts in developing specific curriculum may not be manifested by the accident reports

It was interesting to observe that the respondents did not reflect the same perceived need for safety instruction based on the size of farm animals.

The recommendations included a study to determine what is being taught to farm youth by a variety of agencies.

A Meta-Analysis Ohio Agriculture Teachers' Level of Job Satisfaction

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Introduction/Theoretical Framework

Job satisfaction is one of the most often discussed and continually researched constructs throughout the disciplines of social psychology, organizational behavior, and human resource management (Cranny, Smith, & Stone, 1992). Toward that end, Roznowski and Hulin (1995) wrote that the most important information to have regarding an employee was a validated measure of his or her level of job satisfaction.

Job satisfaction has been defined by several authors. Wood (1973) defined job satisfaction as "the condition of contentment with one's work and its environment, denoting a positive attitude" (p. 8). Locke (1976) defined job satisfaction as, "a pleasurable positive emotional state resulting in the appraisal of one's job or job experiences" (p. 1300). More recently, Wilcox (1992) defined job satisfaction, "as the state where employees are able to obtain the higher social and egotistic human needs" (p.13).

Human needs are the core of job satisfaction theory. The five-stage Hierarchy of Human Needs, introduced by Maslow, serves as the foundation for job satisfaction theory. The Hierarchy of Human Needs is now recognized as the deprivation/gratification proposition (Mertler, 1992). The deprivation/gratification proposition suggests that when an individual identifies a need which is not being met, behavior occurs which is directed toward gratifying the need (Mertler, 1992).

Need gratification, which includes job satisfaction, was further described by Hertzberg, Mausner, and Snyderman (1959), when they developed the Motivator-Hygiene Theory. The premise of the Motivator-Hygiene Theory is that jobs have factors which are related to satisfaction or dissatisfaction. Motivator factors (job satisfier factors) include achievement, recognition, work itself, responsibilities, and advancement. Motivator factors allow individuals to satisfy their psychological potential and are usually related to the work itself. Hygiene factors (job dissatisfier factors) are usually related to the work environment. Hygiene factors include pay, working conditions, supervision, policies, and interpersonal relationships. Hygiene factors are pursued in order to prevent job dissatisfaction or discomfort.

Given the strong theoretical basis on which job satisfaction is based, there has been no strong support for the relationship between an individual's level of job satisfaction and productivity (Bullock, 1984). Vroom (1964) reviewed 20 studies and discovered the median correlation between job satisfaction and performance in each of the studies to be non-significant. More recently, Iaffaldano and Muchinsky (1985), conducted a meta-analysis study to obtain a conclusive report regarding the correlation between satisfaction and performance. In light of statistical advances, larger sample sizes, and improved measurement techniques, Iaffaldano and Muchinsky revealed a non-significant correlation very similar to the correlation between satisfaction and performance discovered by Vroom (1964).

Justification for the need to investigate job satisfaction is exemplified in the seemingly observed relationship between the level of job dissatisfaction and turnover, absenteeism, and tardiness. A report by the Carnegie Forum on Education and the Economy (1986) stated that half the teachers left the profession within seven years (Carnegie Forum on Education and the Economy, in Heller, Clay, & Perkins, 1992). The rate of turnover has been reported as the most consistent measure related to job satisfaction (Padilla-Vellez, 1993). According to Padilla-Vellez, the greatest concern with regard to turnover is associated with the unfavorable conditions which are placed upon an organization. Turnover impacts an organization by: 1) increasing costs related to recruiting, selecting, and training new employees; 2) reducing the morale of employees who remain with the organization; 3) reducing relationships among employees; 4)

projecting an unfavorable image to those who remain informed about the organization; 5) interrupting daily activities; and, 6) by diminishing the opportunity for the organization to grow (Mowday, 1984).

Impacts placed upon students of agricultural education may be greater than those which are placed among other students as a result of agriculture teacher turnover. Agricultural education students in many cases are in agriculture programs for up to five years, where as in an English or Science class, the students may have a different teacher each year until graduation. In this regard, opportunities for the agricultural education program to grow, as well as student achievement, may be affected. Mertler (1992) and Heller, Clay, and Perkins (1993) reported that satisfied teachers were more productive, motivated their students more, and increased student achievement. Based upon the impacts of turnover and the findings of Mertler (1992) and Heller et al. (1993), the ultimate effect for agriculture teachers becomes critically important, given their responsibility to provide effective and stable instruction to youth enrolled in agricultural education programs.

Several studies regarding the level of job satisfaction among agriculture teachers have been conducted by researchers at Ohio State University (Newcomb, Betts, & Cano, 1987; Cano & Miller, 1992; and Castillo, Cano, & Conklin, 1997). Cano and Miller (1992) and Castillo, Cano, and Conklin (1997), in addition to investigating the levels of job satisfaction, also considered demographic characteristics along with a gender analysis of the data. However, the problem exists in that the data has never been analyzed simultaneously to extract similarities and dissimilarities over a period of time.

Purpose and Objectives

The purpose of this paper is to report similarities and dissimilarities of the job satisfaction studies conducted by Newcomb, Betts, and Cano (1987), Cano and Miller (1992) and Castillo, Cano, and Conklin (1997). The following research objectives were formulated to guide the paper:

1. Describe selected demographic characteristics of secondary agriculture teachers in the Newcomb et al. (1987), Cano and Miller (1992) and Castillo et al. (1997) studies.
2. Describe relationships between secondary agriculture teachers' level of job satisfaction and selected demographic variables in the Cano and Miller (1992) and Castillo et al. (1997) studies.
3. Describe the overall level of job satisfaction in the Newcomb et al. (1987), Cano and Miller (1992) and Castillo et al. (1997) studies.
4. Describe the job satisfier and job dissatisfier factors in the Cano and Miller (1992) and Castillo, Cano, and Conklin (1997) study.
5. Describe relationships between selected job satisfier factors (achievement, advancement, recognition, responsibility and the work itself) and the overall job satisfaction of secondary agriculture teachers by gender in the Cano and Miller (1992) and Castillo et al. (1997) studies.
6. Describe the relationships between selected job dissatisfier factors (interpersonal relations, policy and administration, salary, supervision, and working conditions) and the overall job satisfaction of secondary agriculture teachers by gender in the Cano and Miller (1992) and Castillo et al. (1997) studies.

Methods and Procedures

Research Design

The studies (Newcomb, Betts, & Cano, 1987; Cano & Miller, 1992; Castillo, Cano, & Conklin, 1997) included in this paper were all identified as being descriptive correlational.

Population and Sample

The population for the Newcomb, Betts, and Cano (1987) study consisted of 544 agriculture teachers in Ohio (N=544). The sample consisted of a random sample of the male agriculture teachers (N=538, n=366). A census of female production agriculture teachers (N=6, n=6) was conducted. Cochran's (1977) formula for a five percent margin of error was used to determine sample size.

The population for the Cano and Miller study (1992) consisted of 558 agriculture teachers in Ohio (N=558). The sample consisted of a random sample of male agriculture teachers (N=513, n=369) and a census of female agriculture teachers (N= 45, n=45). Cochran's (1977) formula for a five percent margin of error was used to determine sample size.

The population for the Castillo, Cano, and Conklin (1997) study consisted of all secondary teachers of agricultural education in Ohio (N=534). The sample consisted of a random sample of male agriculture teachers (N=453, n=212) and a census of female agriculture teachers (N=81, n=81). The Krejcie and Morgan (1970) formula for determining sample size was used.

Instrumentation

The Brayfield-Rothe "Job-Satisfaction Index", as modified by Warner (1973), was used to measure job satisfaction when all facets of the job were considered in each of the studies (Newcomb, Betts, & Cano, 1987; Cano & Miller, 1992; Castillo, Cano, & Conklin, 1997). Content and face validity for the Job Satisfaction Index in each of the studies was established by a panel of experts consisting of teacher educators and graduate students. Reliability for the Brayfield-Rothe Job Satisfaction Index via the Cronbach alpha procedure was .90, .94, and .90 respectively in the Newcomb, Betts, and Cano (1987), Cano and Miller (1992), and Castillo, Cano, and Conklin (1997) studies.

Wood's (1973) instrument was used to assess the level of job satisfaction among secondary agriculture teachers in the Cano and Miller (1992) and Castillo et al. (1997) studies. Wood's instrument provided the basis for describing teacher perceptions regarding job satisfier and dissatisfier factors. Content and face validity for Wood's instrument were established by a panel of experts consisting of teacher educators and graduate students. Overall reliability coefficients of Wood's instrument via Cronbach's alpha were .89 and .92 respectively, in the Cano & Miller (1992) and Castillo et al. (1997) studies. Coefficients for the ten sub-scales in the Cano & Miller (1992) and Castillo et al. (1997) studies were: achievement .86, .81; advancement .89, .66; recognition .93, .84; responsibility .88, .62; work itself .68, .54; supervision .96, .90; salary .94, .83; interpersonal relations .91, .55; policy and administration .95, .84; and working conditions .90, .92 respectively. Satisfier and dissatisfier factor data were not collected in the Newcomb et al. study. Therefore, comparisons including the Newcomb et al. study will only be conducted with regard to demographic characteristics of respondents and the overall level of job satisfaction.

Data Collection

The data for each respective study were collected by mailed questionnaire. Response rates were 87, 81, and 80 percent respectively in the Newcomb, Betts, and Cano (1987), Cano and Miller (1992), and Castillo, Cano, and Conklin (1997) studies.

Analysis of Data

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer version (SPSS/PC+). Appropriate statistical procedures for description and inference were used. The alpha level was set *a priori* at .05 in the Newcomb, Betts, and Cano (1987), Cano and Miller (1992), and the Castillo, Cano, and Conklin (1997) studies. All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

Results/Findings

The majority of respondents in each study had attained a bachelor's degree or higher. The mean age for teachers in the Newcomb et al. study was 38 (Table 1). There was no report of mean ages among gender for the Newcomb, Betts, and Cano (1987) study. The mean age for female teachers in the Cano and Miller (1992) study was 32.35 years while the mean age for males was 40. 28. The overall mean age for female and male agriculture teachers in the Cano and Miller (1992) study was 36.32. The mean age for female teachers in the Castillo et al. (1997) study was 33.18 while the mean age for males was 42.29. The overall mean age for female and male agriculture teachers in the Castillo et al. (1997) study was 37.75. In the Cano and Miller (1992) study and Castillo et al. (1997) study male agriculture teachers were significantly older than female teachers.

Respondents in the Newcomb et al. study had an average of 11.5 years of teaching experience (Table 1). In the Cano and Miller study (1992) female teachers, on average, had 7.94 years of teaching experience, while males had 13.47. Castillo et al. (1997) reported an average of 7.9 years of teaching experience for females and 16.01 for males. Cano and Miller (1992) and Castillo et al. (1997) reported males as having significantly more years of teaching experience than females. Newcomb et al. (1987) did not report an average number of years in current teaching position for the 1987 study. Regarding the number of years the respondents had been in their current position, females provided a mean response of 5.95 years while males averaged 10.35 in the Cano and Miller study (1992). Castillo et al. (1997) reported female teachers as being in their current teaching position for 6.46 years and male teachers 13.04 years. Cano and Miller (1992) and Castillo et al. (1997) reported males as being in their current teaching positions significantly longer than females.

Table 1. Means, Standard Deviations, and t-tests for Selected Demographic Variables

	1987	1992				1997			
	(n=322)	Female (n= 37)		Male (n=299)		Female (n= 60)		Male (n=171)	
Variable	Mean	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	38	32.35	6.31	40.28	9.28	33.18	9.07	42.29	9.27
Total Years Teaching	11.5	7.94	4.27	13.47	7.39	7.94	7.00	16.01	9.02
Years in Current Position	——	5.95	4.06	10.35	6.74	6.46	6.23	13.04	8.68

Correlations were calculated to describe the relationships between agriculture teachers' level of job satisfaction and selected demographic variables. The coefficients ranged in magnitude from negligible to moderate in the Cano and Miller (1992) study. The coefficients for females were (Table 2): age, -.19; years in current position, -.30; total years teaching, -.27; degree status, .38; and tenure status, .43. Coefficients for males were (Table 2): age, .01; years in current position, -.03; total years teaching, -.03; degree status, .07; and tenure status, .01. The correlation between overall job satisfaction and tenure status was significant for females. In the Castillo, Cano, and Conklin (1997) study, correlations between agriculture teachers' level of job satisfaction and selected demographic variables ranged in magnitude from negligible to substantial. Coefficients for females were (Table 2): age, -.06; years in current position, .01; total years teaching, .01; degree status, -.12; and tenure status, .02. Coefficients for males were (Table 2): age, .04; years in current position, .03; total years teaching, .07; degree status, -.07; and tenure status, -.01. There were no significant relationships between job satisfaction and selected demographic variables for female and male teachers of agriculture.

Based on a five point Likert type scale with responses ranging from strongly disagree (1) to strongly agree (5), respondents in the Newcomb, Betts, and Cano (1987) provided a mean score of 4.14 on the overall job satisfaction scale (Table 3). In the Cano and Miller (1992) study, using the same scale, females provided a mean score of 2.82, while males provided a mean score of 2.80 (Table 3). Female respondents in the Castillo, Cano, and Conklin (1997) study provided a mean score of 4.03 while males provided a mean score of 3.92 (Table 3). The mean scores for female and male secondary agriculture teachers on the overall job satisfaction scales in the Cano and Miller (1992) and Castillo et al. (1997) studies were not significantly different.

Table 2: Relationship Between Overall Job Satisfaction and Selected Demographic Variables

	1992		1997	
Variable	Females (n=35)	Males (n=263)	Females (n=60)	Males (n=171)
Age	-.19	.01	-.06	.04
Years in Current Position	-.30	-.03	.01	.03
Total Years Teaching	.27	-.03	.01	.07
Degree Status	.38	.07	-.12	-.07
Tenure Status	.43*	.01	.02	-.01

*p<.05

Table 3: Means, Standard Deviations, and t-tests for Overall Job Satisfaction

	1987	1992				1997			
	(n=322)	Female (n= 36)		Male (n=288)		Female (n= 60)		Male (n=166)	
Variable	Mean	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Overall Job Satisfaction	4.14	2.82	.16	2.80	.20	4.03	.39	3.92	.43

Note: Based Upon Scale: 1=Strongly disagree; 2=Disagree; 3=Undecided; 4=Agree; 5=Strongly Agree

The Newcomb, Betts, and Cano (1987) study did not investigate job satisfier and dissatisfier factors. Based on a six point Likert type scale with responses ranging from very dissatisfied (1) to very satisfied (6) females provided the following mean scores on the job satisfier and dissatisfier factors in the Cano and Miller (1992) study (Table 4): achievement, 4.34; advancement, 4.04; recognition, 4.08; responsibility, 4.59; the work itself, 4.61; interpersonal relationships, 4.78; policy and administration, 3.85; salary, 4.24; supervision/technical, 3.76; and working conditions, 4.21. Using the same scale, males provided the following mean scores (Table 4): achievement, 4.50; advancement, 4.20; recognition, 4.35; responsibility, 4.70; the work itself, 4.65; interpersonal relationships, 4.91; policy and administration, 4.12; salary, 4.10; supervision/technical, 4.11, and working conditions, 4.08 (Table 4). Female and male teachers did not differ significantly on any of the job satisfier or dissatisfier factors. The Castillo, Cano, and Conklin (1997) study utilized the same Likert type scale and reported the following mean scores for females (Table 4): achievement, 4.40; advancement, 3.88; recognition, 4.10; responsibility, 4.54; the work itself, 5.05; interpersonal relationships, 4.51; policy and administration, 3.69; salary, 4.06; supervision/technical, 3.80; and working conditions, 3.79. Mean scores for males were: achievement, 4.45; advancement, 4.21; recognition, 4.25; responsibility, 4.60; the work itself, 4.84; interpersonal relationships, 4.78; policy and administration, 3.98; salary, 4.20; supervision/technical, 4.11, and working conditions, 4.00 (Table 4). Significant differences were obtained between female and male agriculture teachers on advancement (job satisfier) and interpersonal relationships (job dissatisfier) (Table 4).

Correlations were calculated to describe the relationships between agriculture teachers' overall level of job satisfaction and job satisfier factors. The coefficients for females in the Cano and Miller (1997) study were (Table 5): achievement, .05; advancement, .25; recognition, .22; responsibility, .05; and the work itself, .26. The coefficients for males were (Table 5): achievement, .07; advancement, .05; recognition, .03; responsibility, .05; and the work itself, .07. None of the job satisfier factors were significantly correlated with overall job satisfaction. Coefficients in the Castillo, Cano, and Conklin (1997) study for females were (Table 5): achievement, .55; advancement, .47; recognition, .37; responsibility, .20; and the work itself, .27. The coefficients for males were (Table 5): achievement, .01; advancement, .06; recognition, .10; responsibility, .10; and the work itself, .00. Achievement, advancement, recognition, and the work itself were significantly related to overall job satisfaction for female teachers of agriculture. There were no significant relationships between job satisfier factors and overall job satisfaction for males.

Table 4: Means, Standard Deviations, and t-tests for Job Satisfier and Job Dissatisfier Factors

	1992				1997			
	Female (n= 37)		Male (n=299)		Female (n= 60)		Male (n=171)	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Job Satisfiers								
Achievement	4.34	.74	4.50	.73	4.40	4.65	4.45	.59
Advancement	4.04	.93	4.20	.88	3.88	1.00	4.21	.89
Recognition	4.08	1.04	4.35	1.02	4.10	1.23	4.25	1.00
Responsibility	4.59	.76	4.70	.85	4.45	1.47	4.60	1.09
The Work Itself	4.61	.89	4.65	.87	5.05	1.84	4.84	.73
Job Dissatisfiers								
Interpersonal Relationships	4.78	.56	4.91	.67	4.51	.80	4.78	.67
Policy/Administration	3.85	1.01	4.12	1.06	3.69	1.10	3.98	1.00
Salary	4.24	1.21	4.10	1.23	4.06	1.04	4.20	1.35
Supervision/Technical	3.76	1.34	4.11	1.25	3.80	1.75	4.11	1.19
Working Conditions	4.21	.81	4.08	.90	3.79	1.06	4.00	.93

Note: Based upon scale: 1=very dissatisfied; 2= somewhat dissatisfied; 3=slightly dissatisfied; 4=slightly satisfied; 5=somewhat satisfied; 6=very satisfied

Table 5: Relationship Between Overall Job Satisfaction and Job Satisfier Factors

	1992		1997	
Variable	Females (n=35)	Males (n=263)	Females (n=60)	Males (n=171)
Achievement	.05	.07	.55*	.01
Advancement	.25	.05	.47*	.06
Recognition	.22	.03	.37*	.10
Responsibility	.05	.05	.20	.10
The Work Itself	.26	.07	.27*	.00

*p<.05

Correlations were calculated to describe the relationships between agriculture teachers' overall level of job satisfaction and job dissatisfier factors. The coefficients for females in the Cano and Miller (1992) study were (Table 6): relationships, .21; policy, .25; salary, .33; supervision, .14; and working conditions, .17. Coefficients for the males were (Table 6): relationships, -.02; policy, .03; salary, .12; supervision, .01; and working conditions, .02. None of the job dissatisfier factors were significantly correlated with overall job satisfaction in the Cano and Miller (1992) study. In the Castillo, Cano, and Conklin (1997) study, coefficients for females were (Table 6): relationships, .31; policy, .46; salary, .39; supervision, .31; and working conditions, .30. Coefficients for males were (Table 6): relationships, .03; policy, .10; salary, .14; supervision, .14, and working conditions, .12. All of the job dissatisfier factors were significantly related with overall job satisfaction for female teachers of agriculture in the Castillo et al. (1997) study. There were no significant relationships between job dissatisfier factors and overall job satisfaction for male teachers.

Table 6: Relationship Between Overall Job Satisfaction and Job Dissatisfier Factors

	1992		1997	
Variable	Females (n=35)	Males (n=263)	Females (n=60)	Males (n=171)
Relationships	.21	-.02	.31*	.03
Policy	.25	.03	.46*	.10
Salary	.33	.12	.39*	.14
Supervision	.14	.01	.31*	.14
Working Conditions	.17	.02	.30*	.12

*p<.05

Conclusions, Implications and Recommendations

In the last ten years, there has been a major increase in the number of female teachers of agriculture while in the same time period, a decrease was noted in the overall number of teachers of agriculture in Ohio. However, males continue to be significantly older than the female agriculture teachers. Furthermore, the males, on average, have double the years of teaching experience and years in current position than do the female teachers of agriculture. The findings imply that recruitment efforts targeting females to enter the agricultural teaching profession in Ohio have been effective. In addition, the findings imply that because male teachers of agriculture tend to be older, it is therefore expected that the years of teaching experience would be greater for the male teachers than for the female teachers. The data further implies that female teachers of agriculture have a greater tendency to leave the profession at a faster rate than male teachers of agriculture. In addition, it appears that the male teachers of agriculture remain in the same school for longer periods of time, thereby implying that a greater emphasis may be made by the male teachers to integrate into the local community. It is therefore recommended that the recruitment efforts targeting females to enter into the agriculture teaching profession continue. Title IX funds are available for the targeted recruitment efforts and to develop programs in an effort to retain the female teachers of agriculture. In addition, more research is needed to determine why females tend to leave the agriculture teaching profession at a greater rate than male teachers of agriculture, paying particular attention to the job dissatisfier variables.

It was concluded that the selected demographic variables have remained stable over the past ten years in that the variables were not significantly related to the overall level of job satisfaction. Although the correlation coefficients were stronger in 1992 than 1998, there were no significant findings (except for the relationship between tenure status and females in 1992). The findings imply that the demographic variables were not critical to the overall level of job satisfaction and that older or younger teachers were not necessarily more or less satisfied with their jobs. A further implication is that the longer a teacher remains in the teaching profession, the level of overall job satisfaction will not be effected. Although the demographic variables may not effect the overall level of job satisfaction, the researchers recommend that demographic variables remain an objective of further job satisfaction studies because the demographic variables provide a description of the population being investigated. Furthermore, as efforts are made to increase the number and tenure of female teachers of agriculture, further relational studies may yield changes in the relationship between the overall level of job satisfaction and the demographic variables.

The lowest level of job satisfaction occurred in 1992. Overall, however, female and male teachers of agriculture have remained fairly satisfied to satisfied with their jobs over the past ten years. When considering all facets of the job, outside of the job satisfier and job dissatisfier factors, Ohio teachers of agriculture are satisfied with their jobs. If the purported findings by Mertler (1992) and Heller, Clay, and Perkins (1993), that satisfied teachers were more productive, motivated their students more, and increased student achievement are true, then it could be implied that because the teachers of agriculture are fairly satisfied to satisfied with their jobs, the students enrolled in the agricultural education programs at the high school level have been motivated and have accomplished greater levels of achievement. However, the level of motivation or achievement the agricultural education students enjoy, when correlated with their teacher's level of job satisfaction, has not been explored. Therefore, the researchers recommend that the relationship between the agriculture teacher's level of job satisfaction and their students' level of motivation and achievement be investigated.

Related to the job satisfier factors (achievement, advancement, recognition, responsibility, and the work itself), it was concluded that the Ohio teachers of agriculture remained slightly to somewhat satisfied, with female teachers consistently having lower mean scores than their male counterparts. However, the same teachers have been slightly dissatisfied to slightly satisfied with the job dissatisfier factors (interpersonal relationships, policy/administration, salary, supervision/technical, and working conditions), with female teachers of agriculture consistently yielding lower mean scores than their male counterparts. Furthermore, it was concluded that in 1997, there was a significant difference between male and female teachers of agriculture on advancement (job satisfier).

The data implies that female teachers of agriculture may perceive opportunities for advancement as being minimal, compared to the male teachers of agriculture. Furthermore, it is implied by the data that female teachers of agriculture are more dissatisfied with the job dissatisfier factors, especially the factors dealing with policy/administration, supervision/technical, and working conditions. Could it be that there are some unintended biases placed on female teachers of agriculture brought upon administrators and/or supervisors?

From the written comments provided by the respondents, the respondents consistently reported that the biggest problem encountered was with uninformed and incapable principals and school boards. It is therefore recommended that some of the bureaucracies of the job, such as the supervision and policies adapted by local educational agencies, be reconsidered for biases and amended where needed. In addition, the Agricultural Education Division of the State Department of Education should initiate educational sessions for school administrators at all levels to inform them of the duties and responsibilities of the local agricultural education programs. It is also recommended that the opportunities for advancement for all teachers, but especially for female teachers of agriculture, be investigated and corrections made where necessary, to facilitate more opportunities for advancement for female teachers of agriculture.

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A Critique By:
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A Meta-Analysis of Ohio Agriculture Teachers' Level of Job Satisfaction

A unique situation where three job satisfaction studies were analyzed and attempts made to determine the impact of several employment conditions on job satisfaction. This study has both short-term and long-term impact as most states are facing a shortage of teachers and the teaching profession is experiencing an aging membership. In addition, many of our peers in Agricultural Teacher Education have responsibilities for and conduct a beginning teacher program and should incorporate the topics of satisfiers and dissatisfiers into in-service curriculum.

This study could be and perhaps should be repeated in a number of states to determine if what appears to be a similar experience with job satisfaction is indeed true. The review did not contain the traditional review of literature, but the Introduction/Theoretical Framework section adequately addressed the literature review. A strength of this analysis is that all three studies utilized the alpha level set a priori at .05.

In Table Number Four, the 1997 column heading entitled Female, the standard deviation for Job Satisfiers for Achievement may be an error as 4.65 appears to be an unrealistic number. The discussant found it interesting that items discussed as significant in the narrative portion were not noted as significant on Table 4.

The significant correlations, 4 of 5 job satisfiers listed in Table 5. were not discussed by the authors or possible explanations offered as were the dissatisfiers in Table 6.

The authors clarified as to why the Newcomb, Betts and Cano study was not included in the analysis of Objectives 2,4,5,and 6. The recommendation that working conditions and employment requirements be analyzed for bias towards females is endorsed.

The recommendation that the relationship between the teachers' level of job satisfaction and their students' level for motivation and achievement be investigated is endorsed. There is a general consensus that teachers share, as well as others, a great deal of pride when their students do well and are recognized for their accomplishments. The recommendation that opportunities for advancement for all teachers be studied is supported by the discussant.