2000

Research Provides The Keys To The Future

Proceedings of the 54th Annual AAAE Central Region Research Conference and Seminar in Agricultural Education

February 24-26, 2000
St. Louis Missouri

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Preface

The AAAE Central Region Agricultural Education Research Conference and Seminar was conducted as a joint event February 24, 25, and 26, 2000.

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 ix of this publication.

Eighteen proposals were accepted following the recommendations from the reviewers. The acceptance rate for papers presented at the 2000 AAAE Central Region Research Conference was 69 percent.

Four criteria were established for decision-making regarding acceptance of papers for the 2000 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 States Regional 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. 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

2000 AAAE Central Region Research Conference and Seminar

February 24-26, 2000
St Louis Adam's Mark Hotel

Thursday, February 24

7:00 - 9 p.m.	Registration — Research Conference and Seminar
7:00 - 8 p.m.	Registration — Undergraduate Conference

Friday, February 25

7:30 - 8:30 a.m.	Registration — Research Conference and Seminar
8:30 - 10:00 a.m.	Research Session A
8:30 - 10:00 a.m.	Research Session B
10:00 - 10:20 a.m.	Break
10:20 - 11:55 a.m.	Research Session C
10:20 - 11:55 a.m.	Research Session D
12:00 - 1:15 p.m.	Lunch (part of the program/registration)
1:30 - 2:30 p.m.	Poster Session/Refreshments
2:30 - 4:15 p.m.	Research Session E
2:30 - 4:15 p.m.	Research Session F
4:30 - 5:30 p.m.	General Session Business Meeting Committee Meetings (Research, Program Improvement, Professional Development & Communications)
5:30 - 7:30 p.m.	Dinner — On Your Own
7:30 - 9:00 p.m.	Graduate Student Session

Saturday, February 26

8:30 - 10:00 a.m.	General Session (concurrent sessions)
10:00 - 10:30 a.m.	Break
10:30 - 12:00 noon	General Session — Business Meeting (complete business agenda will distributed at meeting) Committee Reports Research Program Improvement Professional Development Communications Elections

Concurrent Sessions

Session A: Agriculture Literacy

8:30 - 10:00 a.m.

Identifying Sources of Bias in Agricultural News Reporting
B. Kathryn Whitaker, National FFA Organization & James E. Dyer, University of Missouri

Prospective Elementary Teacher Understandings of Pest-Related Science and Agricultural Education Benchmarks
Cary J. Trexler, Iowa State University

Elementary Student Understandings of Pest-Related Science and Agricultural Education Benchmarks
Cary J. Trexler, Iowa State University

Session Chair: Mark Balschweid, Purdue University

Discussant: Joe Gliem, Ohio State University

Facilitator: Neil Knobloch, Ohio State University

Session B: Career Preparation in Agriculture

8:30 - 10:00 a.m.

Agricultural Employment in the Illinois Food, Fiber, and Natural Resource System
Penny S. Haase Wittler, Mohamed Samy, & Joe Harper, University of Illinois

Assessing an Agricultural Education Program's Ability to Prepare Students for Careers in Teaching and Industry
D. Dwayne Cartmell & Bryan L. Garton, University of Missouri

A Delphi Study of Agriculture Teacher Perceptions of Problems in Student Recruitment
James E. Dyer, University of Missouri & Lisa M. Breja, Iowa State University

Session Chair: Allen Talbert, Purdue University

Discussant: Richard Joerger, University of Minnesota

Facilitator: Anna Bell, University of Missouri

10:00 - 10:20 a.m. Break

Session C: Secondary Agricultural Education Programs

10:00 - 11:55 a.m.

The Relationship Among Leadership Perceptions of FFA Members and FFA Chapter Size, Length of FFA Membership, Level of FFA Involvement, and Officer Positions Held
Tracy A. Brick, Kansas State University; Christine D. Townsend, Gary E. Briers, Richard Cummins, & Charles R. Conrad, Texas A&M University

A Longitudinal Study of the Impact of Block Scheduling on Agricultural Education
Andrew J. Baker, Western Illinois University & Ken Bowman, Murray State University

A Description of the Forms of Assistance and the Nature of Events Experienced by Beginning Secondary Agricultural Education Teachers in Minnesota
Richard Joerger & Glenn Boettcher, University of Minnesota

Session Chair: Clark Hanson, South Dakota State University

Discussant: Greg Miller, Iowa State University

Facilitator: Brad Greiman, University of Missouri

Session D: Adult Education Programs

10:00 - 11:55 a.m.

Barriers to Participation in Educational Programs as Perceived by Young Farmers
Awoke D. Dollisso & Robert A. Martin, Iowa State University

Identifying Learning Styles of Iowa Farmers
Kevin E. Miller & Larry D. Trede, Iowa State University

Identification of Educational Needs Using Demographic and Psychographic Variables
Paula Teig & W. Wade Miller, Iowa State University

Session Chair: Earl Russell, University of Nebraska

Discussant: Lloyd Bell, University of Nebraska

Facilitator: Marcus Comer, University of Missouri

12:00 - 1:15 p.m. **Lunch** (part of the program/registration)

1:30 - 2:30 p.m. **Poster Session/Refreshments**

Session E: Higher Education

2:30 - 4:15 p.m.

An Analysis of the Professional Development Needs of Agriculture Teachers
Brad King & Bryan L. Garton, University of Missouri

The Relationship Between Students' Learning Styles, Instructional Performance, and Student Learning
James Graham, Bryan L. Garton & Mary Gowdy, University of Missouri

Factors Explaining Job Satisfaction Among Faculty in the College of Food, Agriculture, and Environmental Sciences at The Ohio State University
Jaime Castillo & Jamie Cano, Ohio State University

Session Chair: Andrew Baker, Western Illinois University

Discussant: Robert Martin, Iowa State University

Facilitator: Dexter Wakefield, Purdue University

Session F: Distance Learning

2:30 - 4:15 p.m.

Motivation and Recognition Preferences of 4-H Volunteers
Susan Fritz, University of Nebraska; Shawn Burrow, Texas Cooperative Extension; Arlen Etling, John Barbuto, Jr., & David Marx, University of Nebraska

Enhancing a Study Abroad Experience Through the Internet
Randall J. Andreasen, Southwest Missouri State University

Learning Strategies for Distance Education Students
Carol Pilcher & Greg Miller, Iowa State University

Session Chair: Wade Miller, Iowa State University

Discussant: N. L. McCaslin, Ohio State University

Facilitator: Mahomed Samy, University of Illinois

Reviewer Acknowledgements

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

Sincere gratitude is extended to the following individuals who served as external reviewers for the 2000 AAAE Central Region Research Conference and Seminar in Agricultural Education

Matt Baker	University of Florida
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Vernon Luft	University of Nevada
Al Mannebach	University of Connecticut
Don Peasley	New York
Richard Poling	University of Tennessee
Glen Shinn	Texas A&M University
Michael Swan	Washington State University
Robert Torres	New Mexico State University
Randol Waters	University of Tennessee
Jill King Webster	Utah State University
Gary Wingenbach	Mississippi State University

Schedule for Future AAAE Central Region Conferences

2001 Ohio

2002 Kansas

2003 Wisconsin

2004 Iowa

2005 Missouri

2006 North Dakota

2007 Nebraska

2008 Minnesota

2009 Indiana

2010 South Dakota

2011 Michigan

2012 Illinois

National Agricultural Education Research Conference

San Diego, California - December 7, 2000

Call for Papers

SPECIFICATIONS

What to send:	**Four copies of the research paper**
Length:	**12 page maximum excluding cover page, single-spaced, 12 point, Times Roman font**
Margins:	**Left margin - 1 ½ inches, others 1 inch**
Placement of Tables and Figures:	**Within the body of the paper**
Style Reference:	**APA Publication Manual (Fourth Edition)**
Deadline:	**Postmarked June 1, 2000 (FAX not accepted)**
Send To:	**NAERC Agricultural Education & Studies 217A Curtiss Hall Iowa State University Ames, Iowa 50011-1050**

Paper Components:

- ✓ **Name, mailing address, phone number, FAX and e-mail addresses of author(s) on a separate title page.**
- ✓ **Paper title (centered, all caps) on first page of paper.**
- ✓ **Introduction/Theoretical Framework**
- ✓ **Purpose(s)/Objectives(s)**
- ✓ **Methods/Procedures**
- ✓ **Results/Findings**
- ✓ **Conclusions/Recommendations/Implications**
- ✓ **References**

Identifying Sources of Bias In Agricultural News Reporting

B. Kathryn Whitaker, Communications Specialist
National FFA Organization

James E. Dyer, Assistant Professor
University of Missouri

Introduction and Theoretical Framework

Agriculture affects everyone. From the stearic acid in the tires of automobiles, insulin for diabetics, milk for newborn babies, sugar in lollipops, to today's advances in genetic engineering, agriculture is a major part of our daily lives (National Cattlewomen's Association, 1991). While these issues have been part of agricultural periodical reporting for decades, recently agricultural issues have come to the forefront of non-agricultural periodical news reporting. More specifically, environmental and food safety issues are receiving increased coverage by all news media (LaMay & Dennis, 1991).

In the early 1980s, journalists began addressing environmental and food safety issues. By the time these types of issues received their attention, however, the issues were so complex that many journalists were overwhelmed by their complexity. Farmers were producing at an all-time level of proficiency using chemicals in almost every phase of their operations. Whereas journalists had been trained in how to write, they were ill equipped to fully understand their influence in the complex relationship between producers and consumers. Journalists found themselves giving background information that led readers to make decisions and draw conclusions based on this information. If that information was tainted, the newly empowered readers and viewers often reacted (or over-reacted) in a misinformed manner (LaMay & Dennis, 1991). Likewise, the quality of articles did not increase with the complexity of the issues. To complicate matters, journalists did little to establish new and better sources of information. LaMay and Dennis noted that they either were not looking for objective and knowledgeable sources, or they had trouble finding them.

According to Whitaker and Dyer (1998), not only is the content of agricultural magazines different from the content of non-agricultural magazines, but also so is the amount of bias in those articles. Whitaker and Dyer reported higher levels of bias in non-agricultural magazines. Is that bias purposefully injected into the articles to sell magazines, or is it because of poor sources of information? Even good journalists are likely to write inaccurate articles if their sources are poor.

Bozell and Baker (1990) noted that news reporting had become more liberal. Lichter, Lichter and Rothman, (1991) noted more than two out of three reporters preferred liberal activist groups of environmental information over more conservative sources. One in four preferred individuals not involved or primarily associated with the environment or food safety issues, such as celebrities speaking either for or against the use certain products. Compared to scientists and agriculturists, they draw equal credibility ratings with the public (LaMay & Dennis, 1991). With this demographic information in mind, the sources these journalists employ become an equally important issue. Variety, accessibility, and credibility are all factors that may determine the quality of sources and stories journalists develop (LaMay & Dennis, 1991).

The theoretical framework of this study lies in the agenda setting theory promoted by Shaw and McCombs (1977). This theory espouses the concept that the media helps set the agenda of the American public. Based on this theory, the public embraces those issues that the media reports. As a result of this information, the public's agenda is then set based upon public opinion, political choice, or a combination of the two.

Reiman (1977) supports this theory reported that the mass media plays a major role in shaping America's agenda. Reiman noted that several journalists might witness the same event but have very different accounts of the story. According to Reiman, the background of the journalists and the sources they used affect their journalistic decisions.

The recent interest in agricultural reporting combined with the reported bias levels in reporting (Whitaker & Dyer, 1998) raises many questions and concerns. Does the reporting of agricultural issues require a higher technical background than does the reporting of other issues? If so, are journalists technically equipped to report about agricultural issues, or do they get technical assistance from other sources? If other sources are used, how are those sources selected? Who dictates the importance of issues? What role does the media play on influencing people's perceptions of agriculture, particularly environmental and food safety issues?

The general problem addressed by this study is the public's perception of agriculture as a threat to food safety and the environment. Specifically, the study seeks to focus on the question, "What are the sources of bias in news periodicals versus agricultural periodicals when reporting environmental and food safety issues in agriculture?"

Since the introduction of technical journalism, the coverage of agricultural issues like the environment and food safety has not been evaluated and/or compared in news and agricultural periodicals over a period of time. Research has failed to address the problem of objectivity and its consequences in both types of periodicals.

As food safety issues become more scientific and environmental issues become more controversial, the sources of bias in reporting must be evaluated. A review of literature revealed that: (1) environmental articles in news magazines are negatively biased against agriculture, and (2) journalists may not be adequately instructed in proper ways to eliminate bias from their articles.

Purpose

The general problem addressed by this study was the public's perception of agriculture as a threat to food safety and the environment. The purpose of this study was to determine how selection of informational sources and media presentation of material contribute to the bias levels of articles in two types of periodicals—news and agricultural—in regards to the environment and food safety.

LeMay and Dennis (1991) noted that bias levels in articles like those relating to agriculture have the potential to be greater than bias levels of less technical and emotional issues. However, are news periodicals more or less biased than agricultural periodicals? Specifically, this study addressed the following research questions:

1. What were the most reported/most important environmental and food safety issues of the decade?
2. What sources do periodicals use when reporting environmental and food safety issues?
3. How do articles differ in presentation between news and agricultural magazines?

Procedures

This study used a descriptive design. The three agricultural periodicals with the largest circulations—*Farm Journal, Progressive Farmer,* and *Successful Farming*—and the three news periodicals with the largest circulations—*Newsweek, Time,* and *U.S. News & World Report*—were evaluated for the purpose of this study. Articles were selected for the 10-year period from 1987-1996.

From a review of literature, several topics were identified as major environmental and food safety topics in agriculture. These issues were, in alphabetical order: Alar, E.coli, Hepatitis A, Hog Operation Pollution, "Mad Cow" Disease (BSE), Ozone Depletion, Pesticide Use, and Salmonella. The expert panel was asked to rank these eight issues in order of importance, from most important to least important. A space was provided for respondents to identify "other" issues they deemed important.

It was decided a priori that the top four issues identified by the respondents would be used to determine the sample of articles. Once these important issues were identified, agricultural periodicals—*Farm Journal, Progressive Farmer, Successful Farming*—and news periodicals—*Newsweek, Time, U.S. News & World Report*—from 1987-1996 were searched for articles relative to those top issues.

Framing techniques described by Berelson (1952) were used to categorize and interpret data. The following frames were used: origin of articles—the author of the article, space and time measures—the length of articles (one column or less, two columns, full page, more than one page), the location of articles, factual information given—given information cited to a recognizable, objective party or to someone else, the inclusion of pictures or cartoons, and topic of article—E.coli, Salmonella, pesticide use, or hog operation pollution.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including measures of central tendency and variability were obtained.

Results

The first research question sought to determine the most reported/most important environmental and food safety issues of the decade. Important issues in agriculture were identified and compared by examining recent press coverage of agricultural issues and sending those topics to an expert panel of professionals in agriculture to rank the issues in order of importance. These individuals included all members of the Coalition for Agriculture Image Promotion, CAIP ($\underline{N}$ = 24). Twenty-two (91.6%) of the CAIP members returned ranking sheets. The remaining two members were eliminated from the study due to company restructuring. Respondents identified the most important issues in agriculture in order of importance as: E.coli, hog operation pollution, pesticide use, and Salmonella. Both pesticide use and Salmonella were identified as equally important among the respondents.

As indicated in Table 1, news magazines accounted for 62.1% of all reported articles on these topics. Of the 74 articles identified, 46 appeared in news magazines, whereas 28 appeared in agricultural publications. When examined by magazine, this disparity appears to have resulted from the sheer number of total articles printed in news periodicals rather than an example of the theory of agenda setting.

Table 1. Number and Percent of Environment and Food Safety Articles in News and Agricultural Magazines.

Magazine	f (n=74)	% of Articles	% of Articles by Magazine
News	46	62.1	
Newsweek	18	24.3	39.1
Time	16	21.6	34.8
U.S. News & World Report	12	16.2	26.1
Agricultural	28	37.8	
Farm Journal	6	8.1	21.4
Progressive Farmer	14	18.9	50.0
Successful Farming	8	10.8	28.6

Of the six periodicals, *Progressive Farmer* had the half of the agricultural magazine articles devoted to environment and food safety issues (50%). *Newsweek* published 39.1% of those attributed to news magazines.

As indicated in Table 2, pesticide use was the issue most covered by all magazines. More than 71% of the articles pertained to pesticides (n = 53). However, according to agricultural professionals, of the four topics identified as important, pesticide use ranked third. E.coli was considered the most important. Only about 7% of the articles related to hog operation pollution (n = 5) and another 7% to E.coli (n = 5). Salmonella articles (n = 11) accounted for the final 15%.

Table 2. Number and Percent of Environment and Food Safety Articles by Issue.

Issue	f	%
Pesticide use	53	71.6
Salmonella	11	14.9
Hog operation pollution	5	6.8
E.coli	5	6.8

When analyzed by year, pesticide use was the dominant issue in 1987, 1989, 1991, 1992, and 1994. In 1990, 1993, and 1996 pesticide use shared the top spot with Salmonella, E.coli, and hog operation pollution, respectively. (See Table 3.)

During the 10-year time frame set for this study, 1989 had the highest number of articles published (n = 25), whereas 1995 had the lowest turnout with only one article. Nearly one-half of the pesticide use articles (n = 24) appeared in 1989. This may have been due to two events: the Alar pesticide scare and the contamination of Chilean grapes with cyanide.

Table 3. Number and Percent of Environment and Food Safety Articles by Year of Publication.

Year of Publication	f	%
1987	10	13.5
1988	7	9.5
1989	25	33.8
1990	4	5.4
1991	5	6.8
1992	3	4.1
1993	8	10.8
1994	7	9.5
1995	1	1.4
1996	4	5.4

While the largest yearly number of articles appeared in 1989, the type of issue covered most frequently was of equal importance. Table 4 shows an analysis of coverage between year and topic. Pesticide use received the most coverage over the ten-year period and was the leading topic in six different years—1987, 1989, 1991, 1992, and 1994. In 1990, 1993, and 1996 it shared high honors with Salmonella, E.coli, and hog operation pollution, respectively. In 1993, E.coli was a major issue when a fast food chain sold contaminated meat that killed young children.

Table 4. Number of Environment and Food Safety Articles by Article Topic and Year.

Year	Hog Operation Pollution	E.coli	Salmonella	Pesticide Use	Total
1987	-	-	4	6	10
1988	1	-	4	2	7
1989	1	-	-	24	25
1990	-	-	2	2	4
1991	-	-	1	4	5
1992	-	-	-	3	3
1993	-	4	-	4	8
1994	1	-	-	6	7
1995	-	1	-	-	1
1996	2	-	-	2	4
Total	5	5	11	53	74

The second research question sought to determine sources that periodicals use when reporting environmental and food safety issues. To answer this question sources were divided into one of five groups: activist, agricultural, business, education, and government. The number of sources, rather than the number of times cited, was tabulated per article.

Table 5 reveals that when sources were cited, the source used most often for information was from an educational institution (62.2%) or governmental agency (60.8%). By contrast, 29.7% of the articles cited one or more activist sources, 36.5% used one or more agricultural sources, and 40.5% used one or more business sources.

Table 5. Sources of Information Used Reporting on Environmental and Food Safety Issues.

No. of Sources Used	Type of Source: Activist f	Activist %	Agricultural f	Agricultural %	Business f	Business %	Educational f	Educational %	Government f	Government %
1	13	17.6	12	16.2	18	24.3	23	31.1	22	29.7
2	7	9.5	9	12.2	9	12.2	18	24.3	8	10.8
3	1	1.4	3	4.1	2	2.7	2	2.7	8	10.8
4	-	-	3	4.1	1	1.4	-	-	4	5.4
5	-	-	-	-	-	-	2	2.7	-	-
6	1	1.4	-	-	-	-	1	1.4	2	2.7
7	-	-	-	-	-	-	-	-	1	1.4
Total	22	29.9	27	36.6	30	40.6	46	62.2	45	60.8

Realizing that how an article is presented is often as influential as the actual content of the article, research question three sought to identify ways that articles differ in presentation between news and agricultural magazines. Specifically, differences in article length, artwork (pictures), and number of reporters assigned to a story were noted.

Magazines regularly print articles in special sections. Where an article is printed and how it is promoted may have much to do with its perceived importance. As noted in Table 6, 87.8% of all articles were published in a special section of the magazine. Almost 15% of those articles appeared in the Business/National Affairs section. Over 13% of the articles appeared in the Feature and Health sections. Science and Cover/Special Report sections both garnered 8.1% of total number of articles. Those sections with the lowest article turnout included: Livestock (2.7%), Horizons, (4.1%), Society/Lifestyle (4.1%), Food/Nutrition (5.4%), Environment (6.8%), and Opinion (6.8%). Additionally, 12.2% of the articles appeared in no marked section.

Table 6. Number and Percent of Articles Appearing in Various Magazine Sections.

Magazine Section	f	%
Business/National Affairs	11	14.9
Features	10	13.5
Health	10	13.5
Cover/Special Report	6	8.1
Science	6	8.1
Environment	5	6.8
Opinion	5	6.8
Food/Nutrition	4	5.4
Horizons	3	4.1
Society/Lifestyle	3	4.1
Livestock	2	2.7
No section listed	9	12.2

To a great extent the length of an article indicates the value the periodical places on the article to convey a message or generate sales. The normal length for most articles is less than one page. Table 7 revealed that of the 74 articles in the study, almost 70% of them were one page or less in length. Approximately 7% of the articles were placed in the "less than one column" category. An additional 37% of the articles were less than two columns. Two articles were more than three pages.

Table 7. Number and Percent of Articles by Length.

Length of Article	f	%
Less than 1 column	5	6.8
1 column	6	8.1
1 ½ - 2 columns	16	21.6
2 ½ - 3 columns (1 page)	23	31.1
1 ½ - 2 pages	17	23.0
2 ½ - 3 pages	5	6.8
More than 3 pages	2	2.7

Table 8. Number and Percent of Pictures per Article.

Number of Pictures Per Article	f	%
0	16	21.6
1	32	43.2
2	12	16.2
3	6	8.1
4	3	4.1
5	3	4.1
6	1	1.4
8	1	1.4

The number of reporters assigned to an article is often considered an indicator of the importance that management places on a particular subject. In this analysis, the number of authors listed varied from zero to six (Table 9). Whereas 21% of the articles had no author listed, 10 articles (13.5%) had two authors, and 10 articles (13.5%) had three authors.

Table 9. Number and Percent of Authors Listed in Articles.

Number of Listed Authors Per Article	f	%
0	16	21.6
1	34	45.9
2	10	13.5
3	10	13.5
4	2	2.7
5	1	1.4
6	1	1.4

Conclusions

News magazines reported a higher number of articles on environment and food safety topics than did agricultural magazines, but at roughly the same percentages, given the weekly publication rate of most news periodicals. Of those articles published, pesticide use was the most reported issue (or tied for first) in eight of the ten years covered by this study.

The most used sources of information by journalists are educational and governmental. This finding supports earlier work by LaMay and Dennis (1991). However, since those are generally the easiest sources from which to get information, the quality of reporting may take a second place to thrift.

Articles are often printed in sections of the publication that appear to have no relationship to the nature of the article. This may be due more to journalistic sensationalism than to deliberate bias. Although logic would dictate that the coverage of most environmental and food safety issues would appear in environmental and/or food/nutrition sections, articles were actually more often found in business and health sections.

The depth in reporting of environmental and food safety issues is lacking. A majority of the reviewed articles were one page or less. Few occurred as "special reports," which received expanded coverage. Likewise, pictures were almost always used (instead of charts, which are inclined to be less biased) and tended to invoke emotional and biased responses.

Recommendations and Implications

According to LaMay and Dennis (1991), journalists have a professional responsibility to control for bias when reporting on sensitive issues. To fairly present all sides of a story, journalists should strive to use a wider variety of sources for factual information, rather than relying heavily on governmental and educational sources (which are usually the least difficult to secure). All facets of an issue should be explored rather than merely relying on the easiest source to furnish information. This can only be accomplished if journalists are proficient in securing diverse and accurate information.

Journalists (and editors) should refrain from sensationalizing issues. Is there more emphasis on selling subscriptions than on unbiased reporting? Likewise, do periodicals rely on pictures to trigger emotions rather than focusing on objective information? Readers should exhibit caution in this area. Bias is only effective if readers allow themselves to be fooled by biased reporting. All readers should objectively evaluate all information published by both types of periodicals.

Agricultural professionals, as well as consumers, should voice their concerns and opinions regarding the coverage of important agricultural issues to both news and agricultural journalists. Likewise, journalists have a responsibility to report news both accurately and fairly. However, all of the responsibility for policing the journalism profession does not rest with journalists themselves. The general public has a responsibility to assess information in an open and evaluative manner. If either group fails in their duties, responsible reporting and consumption of agricultural news reporting will not occur. If this process fails both consumers and agriculturists are likely to suffer from the commission, or omission, of practices that either positively or negatively affect environmental and food safety issues.

Colleges and universities should fully utilize journalistic and agricultural curricula to enhance objectivity of future journalists. Due to the complex nature of agriculture, those journalists who specialize in agricultural reporting should receive special training in agricultural journalism.

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Identifying Sources of Bias In Agricultural News Reporting

A Critique

Joe A. Gliem
Associate Professor
The Ohio State University

This was an interesting article that made for easy and enjoyable reading. The related literature review provided an excellent base from which to conduct this descriptive research study. The objectives were appropriate as was the use of descriptive statistics for data analysis. However, I do have some questions for clarification. The biggest question was why research question three "How do articles differ in presentation between news and agricultural magazines" never answered? The beginning descriptive information and accompanying Table 1, compared and contrasted news magazines and agricultural magazines relative to number of agriculturally related articles, but after that everything was aggregated. No comparisons or contrasts were made between the two types of magazines.

The first research question stated, "What were the most reported/most important environmental and food safety issues of the decade?" Were you interested in "most reported" or "most important"? There could be a big difference depending on what criterion was used in identifying the important issues.

I also wonder what was used as the operational definition for "major" in the statement, "From a review of literature, several topics were identified as "major" environmental and food safety topics in agriculture. Likewise, what was the operational definition for "importance" in the statement, "The expert panel was asked to rank these eight issues in order of "importance" from most important to least important." Was importance operationalized by damage caused, dollars lost, people injured, perceived implications, or what? It was also indicated that members of the Coalition for Agriculture Image Promotion was used as your expert panel to rank the issues. Why was this panel chosen to be the experts rather than scientists in the various disciplines related to the issues?

Table 3 has no text to support it and thus appears not to be needed. It tends to compliment Table 4 so you may want to consider combining the two tables into one.

The last two questions concern the conclusions for the study. When talking about information sources, it is concluded the most used sources of information by journalists are educational and governmental sources. However the author goes on "... since those are generally the easiest sources from which to get information, the quality of reporting may take a second place to thrift." More of an explanation would be helpful here. Is the insinuation that because the information is available cheaply the worth of the information as news is also cheap? Lastly, since it is a relatively well known fact that major news magazines differ their content by region and advertiser wishes, was any investigation of differences relative to bias looked at on a regional basis rather than on a global basis?

In summary, this was an interesting research study that with some clarification can add new knowledge to the literature base. I commend the authors for doing a nice job with this research project and encourage them to pursue additional research in this area.

Prospective Elementary Teachers' Understanding of Pest-Related Science and Agricultural Education Benchmarks

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Science and technology are increasingly called upon to aid society in the name of progress, prosperity, and economic growth. As technological innovations are adopted, however, society becomes more fearful of their risks. Beck (1992) suggests that industrialized societies are transitioning to "risk" societies where "the gain in power from techno-economic progress is increasingly overshadowed by the production of risks" (p. 13). Philosophers of science Rouse (1987) and Feenburg (1995) caution that society should critically question the use of science and technology to determine what it values.

In the agri-food system, few technologies are more feared than pesticides. Sachs, Blair and Richter (1987) found that consumers were increasingly concerned with the risks of pesticides to the environment and to personal health. Interestingly, perceptions of risks from residues of agrichemicals in food differ greatly among members of the public. van Ravenswaay (1995) found that "approximately one-fourth [of respondents] perceives a great chance of harm from pesticide residues in food whereas approximately the same percentage perceives very little or no chance" (p. 1). Like pesticides, the use of genetically-modified organisms (GMOs) to reduce crop loss is emerging as a global concern (Progressive Farmer, 1999). In the United States, as in Europe before it, a growing number of consumers are skeptical of the benefits promised by this new technology (Hillyer, 1999).

To assess the trade-offs of pesticides and GMOs in terms of human health and safety, and the environment, individuals need to possess a basic understanding of scientific and technological principles. Acquiring such understanding is a cumulative process that begins when people are very young. If U.S. society is to have discourse about risks and benefits of agricultural technologies, schools must integrate agri-food system concepts and examples into curricula to promote literacy (Leising & Zilbert, 1994; Trexler, 1998). Science educators also believe that agri-food system information and concepts are essential for public school curricula. In 1989, the American Association for the Advancement of Science (AAAS) in its visionary work "Project 2061: Science for All Americans" identified agriculture as one of the eight basic technology areas for study by U.S. students.

Problems arise in regard to educating the public about the agri-food system; researchers know little about what individuals understand about this complex system. The Council of Agricultural Science and Technology underscores the need for research focused on technology. The Council suggests that "more research is needed to develop valid and reliable theories, methods, and conclusions about public perceptions of agrichemicals and other agricultural technologies (van Ravenswaay, 1995). Decisions about complex societal and environmental issues--such as trade-offs with the use of pesticides and GMOs--require theories to explain how people come to learn about complex interrelationships. With these theories, educational programs and curricula can be designed to help learners construct schema that are compatible with current scientific understandings.

This study's theoretical framework is built upon research from science education. To determine the accuracy of idiosyncratic understandings, science education researchers have compared student conceptions with those of experts (Driver, Guesne, & Tiberghien, 1985; Posner, Strike, & Gertzog, 1982). These studies, based on Piaget's work in cognitive psychology, tend to follow the theory that learning occurs through the construction of mental schema. Schemas serve as interchangeable slots or placeholders that represent general knowledge structures (Anderson, Spiro, & Anderson, 1978).

Currently there exists a growing body of knowledge on the "agricultural literacy" of students, prospective teachers, and adults (Flood & Elliot, 1993; Birkenholz, Frick, Gardner, & Machtmes, 1994; Frick, Birkenholz, & Machtmes, 1995). In agricultural education, abundant knowledge and positive perceptions gleaned through survey research are often equated with literacy. Frick and Wilson (1996) suggest, however, that agricultural literacy involves, not simply a cache of facts, but "a basic understanding of agriculture" (p. 59). Presently, agricultural educators do not clearly understand what people "understand" about the agri-food system.

To help elementary students develop such understandings, Frick, et al (1995) argues that prospective teachers require assistance. Humphrey, Stewart, and Linhardt (1994) and Terry, Herring, and Larke (1994) suggest that such assistance should come in the form of developing teacher agricultural knowledge and developing their capacity to teach this content. Trexler and Suvedi (1998) suggest that--concomitant to developing teachers' understanding of agricultural concepts--assistance should be provided to develop teachers' capacity to infuse agricultural concepts into curriculum. In regard to preservice teachers, no research currently exists that examines their understandings of the content they will be expected to teach about related pests, crop protection, and the impacts of using pesticides on crops. By ascertaining prospective teacher understandings of this elementary education content, university educators can better design courses to increase knowledge and confidence, and strengthen capacity to infuse pest-related topics into the curricula.

Purpose and Objectives

The purpose of this qualitative study was to determine prospective elementary teacher understandings of agri-food system educational benchmarks. More specifically, this study sought understandings of elementary education benchmarks related to pests, crop protection, and the impacts of using pesticides on crops. The objectives of this study were:

1. To determine informants' backgrounds and experiences.
2. To compare prospective elementary teacher understandings with expert understandings for pest-related educational benchmarks for the K-5 grade levels.
3. To ascertain if commonalties exist among informants with regard to their backgrounds and experiences, and to their understandings of pest-related benchmarks.

Methods and Procedures

Population

The population for this study included eight purposefully selected prospective elementary teachers who were of either junior or senior standing. Prospective teacher selection was based upon educational background. Only one student participating in this study minored in science; students were sought who had little or no science background as they are representative of most elementary educators.

Letters describing the study were distributed to elementary education majors who were enrolled in Michigan State University's (MSU) Agricultural and Extension Education's (AEE) "Issues in Agricultural and Environmental Education" course. These students were asked to solicit participation of other elementary education majors that they knew. No student enrolled in the class participated in the study. In addition, the researcher visited four elementary education teaching methods courses to seek participants. Participants came from both of these sources--five from the AEE students and four from the methods courses. Initially a $6.00/hour stipend was offered for participation in the study, but few volunteers came forth. Therefore, the stipend was increased to $20/hour, and volunteers were then turned away.

Data Collection

Clinical interviews were used to surface informant understandings of pest-related benchmarks and to identify cognitive structures and states of cognitive development (Novack and Gowin, 1984; Posner and Gertzog, 1982). Each interview took roughly 45 minutes. Approximately 5 minutes were spent determining demographic background; the remainder probed student understanding of benchmarks. Interviews were videotaped and transcribed, serving as the primary data sources. Field notes and products created by the interviewees were consulted as secondary data.

Interview Questions and Protocol

To ground the research interviews in previous scholarship, the researcher developed a synthesis of pest-related elementary level educational benchmarks from the disciplines of science (American Association of the Advancement of Science, 1993) and agricultural education (Leising & Zilbert, 1994). Members of MSU's departments of Science Education and AEE reviewed questions and protocol. The interviews began with questions about the background of each student. To link the conversation in a familiar context, interviewees were provided a cheeseburger from a nationally known fast food chain. The researcher hoped that by starting with this common basis informants could easily express their ideas about the steps this familiar food goes through on its way from production to consumption. Questions required reflection on the lettuce and meat; these two foods were selected because they were the least processed of the cheeseburger's components. Further questions probed understandings of pest-related benchmarks.

Analysis of Data

In this study, two different strategies were used to analyze data. First, demographic information was reported descriptively. The second strategy used Hogan and Fisherkeller's (1996) strategy for representing highly complex thinking to answer research objectives pertaining to agri-food system understandings.

Analysis of data involved four phases. First, the researcher developed expert propositions related to three benchmarks and associated subconcepts. MSU's Science Education and AEE faculty validated these. Anderson (1995) suggests clinical interviews be limited in terms of the organization of academic knowledge and the language needed for discourse about the academic knowledge. With this in mind, expert propositions and goal conceptions for elementary content were based on synthesis of science and agricultural education benchmarks (Trexler, 1997a). Table 1 lists the key concepts, benchmarks, and language needed for discourse about the benchmark.

Table 1. Key Concepts, Benchmarks, and Language.

Key Concepts	Benchmark	Language
How do humans manage crops?	1. Describe how crops may be lost to pests.	pest, damage, loss
	2. Explain how crops are protected from weeds and pests.	kill, poison, chemicals, pesticides, poisons, barrier
	3. Describe the positive and negative impacts of using poisons (pesticides) to protect crops.	poisons, harmful, benefits, costs, profit, positive, negative, labor, resistance, disease, increase, decrease

In the second phase of analysis, raw data from student interview tapes were analyzed by generating conceptual proposition maps. These maps served as summary portrayals of prospective teacher thinking for each benchmark (West, Fensham, & Garrard, 1985). Finally, maps were verified for accuracy by comparing them repeatedly with interview tapes of informants. At a minimum, each tape was viewed three times.

Phase three focused on coding prospective teacher responses. The sophistication of thinking about a given benchmark--as represented in the conceptual proposition map--was judged along two dimensions: quality (compatibility) and depth (elaboration of response) by comparison with expert propositions. Prospective teacher understandings were assigned codes based upon this comparison scheme (Table 2).

Table 2. Coding Scheme to Compare Propositions with Experts.

Code	Description
CE (Compatible Elaborate)	Statement concurs with the expert proposition and has sufficient detail to show the thinking behind the concepts articulated.
CS (Compatible Sketchy)	Statement concurs with expert proposition, but lacks essential details. Pieces of facts are articulated but are not synthesized into a coherent whole.
CI (Compatible/Incompatible)	Sketchy statements are made that concur with the proposition, but are not elaborated upon. At other times, statements contradict proposition.
IS (Incompatible Sketchy)	Statements disagree with the proposition, but provide few details, and are not recurring. Responses appear to be guesses.
IE (Incompatible Elaborate)	Statements disagree with proposition, and students provide details or coherent, personal logic supporting them. Same or similar statements/explanations recur throughout the conversation.
N (Nonexistent)	Students respond "I don't know" or do not mention the topic when asked a question calling for its use.
ø (No Evidence)	A topic is not directly addressed by a question, and students do not mention it within the context of their response.

The final phase of analysis sought confirming and disconfirming evidence of patterns among individuals (Miles & Huberman, 1994). This was accomplished by two procedures. First, each benchmark was analyzed across individuals. And second, holistic portraits of prospective teacher thinking were analyzed to ascertain how understanding of subconcepts might influence other benchmarks.

Findings and Discussion

Research Objective 1: Informants' backgrounds and experiences.

Background

Table 3 provides information for the prospective teacher informant's relative background including gender, race, school, geographic location of where they were raised, parental occupation, and socioeconomic status (SES).

Table 3. Background of Prospective Teacher Informants.

Name	Gender	Ethnicity	School	Raised	Parents' Occupation
Sid	Male	European American	Public School MSU-El Ed, Social studies	Suburban Detroit	Father- Electrician
Kat	Female	European American	Public School MSU- El Ed, English	Suburban Detroit	Mother- High school science teacher Father- Landscape architect
Molli	Female	European American	Catholic School MSU- El Ed, Special Education	Detroit	Mother- Pre-school teacher Father- Special education teacher
Kara	Female	European American	Catholic School MSU- El Ed, English	Southern rural Michigan	Father- Farmer
Di	Female	European American	Public School MSU- El Ed, English	Detroit	Father- Detroit civil servant
Dan	Male	European American	Public School MSU- El Ed, Agriscience	Southwestern rural Michigan	Father- Hardware store owner
Guy	Male	European American	Public School MSU- El Ed, Social studies	Suburban Detroit	Father- Janitor Mother- Sales clerk
Meri	Female	European American	Public School MSU- El Ed, Social studies	Southeastern rural Michigan	Mother- Real estate agent

There were eight informants in this category; three were male and five were female. All of them were of European ancestry--all were White. They did vary in their schooling. Two had attended Catholic school, and the others attended public school before college. All informants attended MSU and majored in elementary education, although they had different minors. Although they were not purposefully selected for variance in geographic locations where they were raised, three students came from rural backgrounds, three from the suburbs, and two from the city of Detroit. Occupations of the prospective teachers' parents varied--from janitor to landscape architect.

Experience

Table 4 summarizes food and agriculturally related experiences.

Table 4. Food and Agriculturally Related Experiences of Prospective Teachers.

Name	Shopping	Cooking	Gardening	Farming
Sid	Yes , mother	Sometimes cooks	Yes	No
Kat	Yes, mother	Doesn't cook	Yes, with father when young	No
Molli	Yes, mother	Now just beginning to cook	No	No
Kara	Yes, mother	Very little cooking	Yes	Sometimes with father
Di	Yes, mother	One day a week when young, daily	No, but grandparents did	No
Dan	Yes, mother	Yes, anything quick	Yes	A little with friends
Guy	Yes, mother	Cooks every night	No	No
Meri	Yes, mother	Loves to cook	Yes	No

All prospective teacher informants had shopped with their mothers for food. They ranged in their experiences from never to an impassioned love of cooking. For the most part, though, most informants occasionally cooked. As for gardening, five informants had grown food with their parents, one young woman's grandparents had a garden, and two had no experience whatsoever. Interestingly, two informants had experience working on farms.
All informants had food-based experiences. The primary difference among them was experience with gardening. Two informants from Detroit had never grown food

Research Objective 2: Prospective teacher understandings of pest-related benchmarks.

The second research objective focused on prospective elementary teacher understanding of the benchmarks related to a) crop loss due to pests, b) crop protection, and c) the impacts of using poisons to protect crops. Codings of informant understandings for the benchmarks are found in Table 5. Detailed descriptions of the findings follow.

Table 5. Prospective Teacher Understanding of Pest-Related Benchmarks.

Benchmarks	Sid	Kat	Molli	Kara	Di	Dan	Guy	Meri
1. Describe how crops may be lost to pests.	CS	CS	CS	CS	CS	CS	CS	CS
2. Explain how crops are protected from weeds and pests.	CS	CS	CS	CS	CS	CS	CS	CS
3. Describe the positive and negative impacts of using poisons to protect crops.	CS	CS	CS	CS	CS	CS	CS	CS

ø--No evidence; N--Nonexistent; IE--Incompatible Elaborate; IS--Incompatible Sketchy; CI--Compatible/Incompatible; CS--Compatible Sketchy; CE--Compatible Elaborate.

Benchmark A. Describe how crops may be lost to pests.

As shown in Table 5, all informants were Compatible Sketchy in their understanding of how crops may be lost to pests. All informants, except Guy, understood that crops could be lost to insects and other animals, such as rodents and deer. Guy spoke only of losses due to insects. Di, Dan, and Kara specifically stated how these might take place: eating of plants while growing or the nesting of insects in the crop. No informant spoke of losses to crops after harvest.

Only Sid, Di, and Dan spoke of weeds affecting crop growth negatively. Di was the only informant that proffered a reason for these losses--the competition for minerals by weeds with crops. She stated:

D- Well, I know in gardens you weed. I don't know if you would have to do that in a big sort of field with any machines, but I'm assuming you'd wanta keep other little plants from taking the minerals from the soil [questioning, nervous laugh].
I- OK is there anything else that those little plants might do, take the minerals from the soil, anything else?
D- Um, maybe attract other bugs, but I can't think of anything else.

It is noteworthy that no informant spoke of competition for space and sunlight between weeds and crops.

Benchmark B. How are crops protected from weeds and pests?

As indicated in Table 5, all informants were Compatible Sketchy in their understandings related to crop protection. In the expert conception for this benchmark, three methods were listed to protect crops: a) establishing barriers to animals, b) killing of pests with poisons (pesticides), and c) breaking the life cycle of pests through management techniques. No informant spoke of all three methods. Dan and Meri understood that barriers and pesticides could be used to control pests, while the others--except Di--all stated that pests could be killed with pesticides. Meri had firsthand knowledge and experience with pesticides that led her to strong beliefs about their use. She stated:

I- Can you tell me a little bit more about insecticides or pesticides?
M- Well I don't know if there's a difference.
I- Tell me a little about that.
M- What I know or how they would use them?
I- Both.
M- Well they would probably just spray it on the fields with tractors that pulls one of those big tanks and spray it on the lettuce.
I- You've seen that before? Where at?
M- In Lapeer, basically so the bugs don't eat the lettuce. They spray broccoli; they spray; they spray everything, um, I don't like the idea that they spray everything.
I- How come?
M- I mean you're eating the pesticides, I mean, would you rather eat bugs or pesticides? It's kind of gross to think about it , but at least the bugs won't kill ya in the long run.

Kara also had experiences that led her to a fairly deep understanding of how humans control and manage pests. She believed that insects knew that crops sprayed with pesticides were toxic. Di mentioned nothing about pesticides, but did speculate that weeds might be controlled by the use of machines in large fields. Sid mentioned that weeds could be controlled with herbicides:

I- OK, you talked about rabbits a while ago and protecting it {lettuce] from rabbits. Is there anything else they would need to . . .
S- Um, I guess pesticides maybe, herbicides. Stuff to keep weeds out, certain bugs maybe.
I- Why would that be important?
S- Well, possibly of destroying their crop.
I- OK, and what would be the significance of that?
S- Of having the crop destroyed? Well, they wouldn't make any money and we might not be able to eat McDonalds™ hamburgers.

Benchmark C. Positive and negative impacts of using poisons to protect crop.

Table 5 notes that all informants held a Compatible Sketchy understanding of the positive and negative effects of pesticides (poisons) to protect crops. This benchmark is very complex and entails multiple subconcepts. The expert proposition included both benefits and liabilities. Benefits included: a) reduction in labor, b) increase in crop yield, and c) decrease in human disease. On the other hand, liabilities included: a) expense of pesticides to farmers and ultimately to consumers, b) pest resistance to poisons, c) contamination to the environment, and with it, death and morbidity to living things, and d) decrease in the use of sustainable practices based upon a reliance on pesticides. No informant articulated an understanding of all these trade-offs.

In regard to benefits, all informants understood that pesticides could contribute to increased crop yields and greater profits for the farmer. Only two of the informants had further understanding of how these poisons might benefit humans. Di stated that pesticides could reduce human disease, and Meri spoke of decreasing labor costs through their use.

Relative to negative impacts of pesticides, informants' discourses were relatively extensive in comparison with other benchmarks in this key concept. All informants, except Di, mentioned that pesticides could cause contamination to the environment and might be detrimental to living things. Guy, Kara, Molli, and Kat mentioned that certain pesticides caused cancer in humans. Similarly, Dan, Sid and Meri mentioned death and morbidity in other animals, but did not specifically mention human beings. Only Di mentioned the expense of pesticides to the producers of food. She also mentioned that people were fearful of pesticides; this, she said, was a problem. Listed below are responses illustrative of the informant's ideas about the impact of pesticide use.

Kara had a well-developed schema for the impact of pesticide use. She understood that pesticides were either organic or inorganic, that some were harmful to humans, reduced labor, cured bugs, led to protection of a crop, and there was an economic incentive for their use.

I- Tell me a little about this thing with pesticides.
K- The pesticides are things--either natural or whatever--that cure the bugs.
I- OK, why would that be important?
K- So that the farmer's crops weren't destroyed by a plague of locusts.
I- OK, and then why would that be important?
K- Because if you didn't have any lettuce you wouldn't make money and you'd lose the farm.
I- OK, how about more broadly speaking?
K- We won't have any lettuce for our BigMacs™.
I- OK, you talked about insects and insecticides, what are the positive things about them?
K- They're good because they protect the lettuce and that's good, some of them are cancerous or bad for people, some are bad for the environment.
I- How do you know that?
K- Just from the news or whatever, and just know that pesticides, and like the water that's probably not such a good thing.

Molli was concerned that the use of pesticides would result in contamination of food. She spoke about the motive behind the production of food and stressed that economics was a driving force, not health.

I- OK, how about anything that would be a trade-off, a negative, a liability of using [pesticides].
M- Well, they can cause, like perhaps, disease on the food.
I- OK, what do you mean by that.
M- Like, well any chemical on food isn't healthy for you. So, if it's too many chemicals someone can get sick from it. If its not cleaned properly, you know they have the risk of people getting sick and lawsuits, or just people not using their business anymore.
I- So with that possibility, why do we use them?
M- I think people are just more concerned with selling the food and getting it out. You know, the selling and buying aspect. They actually, I mean, this isn't a healthy meal [pointing to a BigMac™], but they want to sell it to people and they will sell it any way they can.

Both Sid and Meri mentioned that crops could be grown organically, instead of using "chemical" pesticides. Sid stated that he didn't consider the use of pesticides in the production of the food he ate, while Meri was conscious of pesticide use and had purchased organic food herself. She believed that organic pesticides were less harmful than those from inorganic, human-made sources.

Research Objective 3: Commonalties with regard to informant backgrounds and experiences and their understandings of pest-related benchmarks.

The study's third objective assessed commonalties among informants with regard to background and experiences and their understanding of pest-related benchmarks. The goal was to determine if associations between these variables were apparent. These variables included demographic background and food and agriculturally related experiences.

Deeper levels of understanding of these benchmarks appeared to be linked with prior experiences. For example, the informant whose father was a farmer described both positive and negative impacts of pesticides in detail. On the other end of the spectrum, an informant from Detroit who had never grown a garden was the most suspicious of pesticide use and questioned the motivations of those who used them. Interestingly, two informants mentioned the production of organically grown crops and one even purchased them.

Conclusions

1. Out-of-school experiences were the strongest determinant of informant ability to engage in discourse that was compatible with experts. This is supported by the fact that informants who held the understandings most compatible with expert conceptions, time and again, related their discourse to personal experiences and not school-based learning.

2. The "Compatible Sketchy" codings were most common. This indicates that informants held incomplete understandings of science and agricultural education benchmarks. These incomplete understandings often required informants to make connections between scientific, societal, and technological concepts.

3. Informants lacked language to accurately articulate an understanding of benchmarks. This is noteworthy because Fine (1990) suggests that humans, as social beings, use "language as the primary shaper of meaning" (p. 129), and because Cazden (1988) argues that speech unites the cognitive and social" (p. 1). Without language, then, there can be no conveyance of meaning. Thomson (1996) found that adult food consumers lacked language to express their thoughts about the agri-food system.

4. Most prospective teachers lacked knowledge about and understanding of the positive and negative impacts of pesticide use. Without this schema, there is no way to intelligently weigh impact of pesticides and other crop technologies, e. g., GMOs. This is of particular import as the most informants were more discursive about the negative aspects of pesticides and appeared to ignore the benefits. This is of increasing import as society debates the merits of herbicide-resistant GMO crops (Hillyer, 1999).

Recommendations

Further research can shed light on pest-related understandings of prospective elementary teachers. Specifically, additional use of this study's research protocol by other researchers, with similar but different groups, can lead to generalizability of findings. These studies might target "sketchy" (incomplete) conceptions.

Implications

1. Clinical interviews were fruitful in surfacing informant understandings of pest-related benchmarks; therefore, this methodology has implications for researchers as they seek to ascertain what people "understand" (Frick, Kahler, & Miller, 1991; Frick & Wilson, 1996) about the agri-food system. Survey methodologies dominant in agricultural education research cannot readily ferret out idiosyncratic cognitive structures.

2. Societies of experts--such as university agricultural and science educators--may find this study of interest as it underscores the need for cooperation between them. Specifically, prospective teachers were ill prepared to teach elementary curricula specified by both agricultural and science educators.

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Prospective Elementary Teacher Understandings of Pest-Related Science and Agricultural Education Benchmarks

A Critique

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Let me begin these comments by stating I am a quantitative researcher not a qualitative researcher. Some individuals have stated that case studies have the following disadvantages: oversimplification, exaggerations of the facts; they are unscientific, opportunistic, and unrepresentative; and they are partial accounts masquerading as full accounts. While this may be true, I have tried to minimize my bias by consulting several qualitative references and with colleagues experienced in qualitative research methods. I will also use this same critique for both research articles by this author as the related literature review for both were identical with the exception of one paragraph and the methodology was the same. I might add, it appears inconsistent that the same related literature base can be used for both elementary students and prospective elementary teachers.

The author uses a fair amount of jargon in the paper with such words as idiosyncratic understandings, mental schema, and benchmarking. From the related literature cited, the author was interested in measuring student understandings of the risks and benefits of complex agricultural systems. He says, "Decisions about complex societal and environmental issues – such as trade-offs with the use of pesticides and GMOs – require theories to explain how people come to learn about complex interrelationships." This I suggest is a problem in the conduct of the study. Why would anyone expect fifth grade students or prospective elementary teachers to understand the complex scientific and technological interrelationships surrounding these issues? I would suggest there are Ph.D.'s in those very fields that do not yet fully understand the interactions that occur. To expect those not trained nor experienced in agriculture to understand these issues sets the research up for failure before it begins.

Likewise, I am not sure the objectives of the study can be met due to the aforementioned comments. The author does acknowledge that clinical interviews need to be limited in terms of the organization of academic knowledge and the language needed for discourse about the academic knowledge. However, the same key concepts, benchmarks, and language needed to engage in discourse about the benchmark was used for both fifth grade students and prospective elementary teachers.

Lastly, I would like to have seen much more detail in the methodology section of the paper. To help establish internal validity it would have been helpful had the author provided more detail about strategies such as triangulation, member checks, long-term observation, peer examination, and researcher biases. External validity could have been enhanced had the author provided a rich, thick description of the situation so others could match the research situation, had provided more detail relative to how typical the individuals in the study were with others in the class, and had used multisite designs. Lacking such detail, the reader is left to wonder about these research threats.

In summary, while I applaud the author for trying a qualitative approach to developing new theory, I would suggest this paper was premature for this conference. At best it appears to be a work in progress and as a result adds little if anything to the literature base.

Elementary Students' Understanding of Pest-Related Science and Agricultural Education Benchmarks

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Science and technology are increasingly called upon to aid society in the name of progress, prosperity, and economic growth. As technological innovations are adopted, however, society becomes more fearful of their risks. Beck (1992) suggests that industrialized societies are transitioning to "risk" societies where "the gain in power from techno-economic progress is increasingly overshadowed by the production of risks" (p. 13). Philosophers of science Rouse (1987) and Feenburg (1995) caution that society should critically question the use of science and technology to determine what it values.

In the agri-food system few technologies are more feared than pesticides. Sachs, Blair, and Richter (1987) found that consumers were increasingly concerned with the risks of pesticides to the environment and to personal health. Interestingly, perceptions of risks from residues of agrichemicals in food differ greatly among members of the public. van Ravenswaay (1995) found that "approximately one-fourth [of respondents] perceives a great chance of harm from pesticide residues in food whereas approximately the same percentage perceives very little or no chance" (p. 1). Like pesticides, the use of genetically modified organisms (GMOs) to reduce crop loss is emerging as a global concern (Progressive Farmer, 1999). In the United States, as in Europe before it, a growing number of consumers are skeptical of the benefits promised by this new technology (Hillyer, 1999).

To assess the trade-offs of pesticides and GMOs in terms of human health and safety and the environment, individuals need to possess a basic understanding of scientific and technological principles. Acquiring such understanding is a cumulative process that begins when people are very young. If U.S. society is to have discourse about risks and benefits of agricultural technologies, schools must integrate agri-food system concepts and examples into curricula to promote literacy (Leising & Zilbert, 1994; Trexler, 1998). Science educators also believe that agri-food system information and concepts are essential for public school curricula. In 1989, the American Association for the Advancement of Science (AAAS) in its visionary work "Project 2061: Science for All Americans" identified agriculture as one of the eight basic technology areas for study by U.S. students.

Problems arise in regard to educating the public about the agri-food system; researchers know little about what individuals understand about this complex system. The Council of Agricultural Science and Technology (CAST) underscores the need for research focused on technology. CAST suggests that "more research is needed to develop valid and reliable theories, methods, and conclusions about public perceptions of agrichemicals and other agricultural technologies (van Ravenswaay, 1995). Decisions about complex societal and environmental issues--such as trade-offs with the use of pesticides and GMOs--require theories to explain how people come to learn about complex interrelationships. With these theories, educational programs and curricula can be designed to help learners construct schema that are compatible with current scientific understandings.

This study's theoretical framework is built upon research from science education. To determine the accuracy of idiosyncratic understandings, science education researchers have compared student conceptions with those of experts (Driver, Guesne, & Tiberghien, 1985; Posner, Strike, & Gertzog, 1982). These studies, based on Piaget's work in cognitive psychology, tend to follow the theory that learning occurs through the construction of mental schema. Schema serve as interchangeable slots or placeholders that represent general knowledge structures (Anderson, Spiro, & Anderson, 1978).

Currently there exists a growing body of knowledge on the "agricultural literacy" of select groups (Flood & Elliot, 1993; Frick, Birkenholz, Gardner, & Machtmes, 1995). In agricultural education, abundant knowledge and positive perceptions gleaned through survey research are often equated with literacy. Frick and Wilson (1996) suggest, however, that agricultural literacy involves, not simply a cache of facts, but "a basic understanding of agriculture" (p. 59). Presently, agricultural educators do not clearly understand what elementary students "understand" about the agri-food system.

Purpose and Objectives

The purpose of this qualitative study was to determine elementary student understandings of agri-food system educational benchmarks. More specifically, this study sought student understandings of pests, crop protection, and the impacts of using pesticides on crops. The objectives of this study were:

1. To determine informants' backgrounds and experiences.
2. To compare elementary student understandings with expert understandings for pest-related educational benchmarks.
3. To ascertain if commonalties exist among informants with regard to their backgrounds and experiences, and to their understandings of pest-related benchmarks.

Methods and Procedures

Population

The population for this study included nine purposefully selected 5th grade students. Fifth grade students were selected as informants because they: a) have reasonably well-developed language skills, b) are typically still classified as elementary students, and c) fall into a grade that is defined within the agri-food system benchmarks. Their selection was based upon type of school attended (private, public, charter, middle, elementary), gender, socioeconomic status (SES), geographic location of residence, and ethnicity. A $6.00 honorarium was provided for participation in the study.

Data Collection

Clinical interviews were used to surface informant understandings of pest-related benchmarks and to identify cognitive structures and states of cognitive development (Novack & Gowin, 1984). Each interview took roughly 45 minutes. Approximately 5 minutes were spent determining demographic background; the remainder probed student understanding of benchmarks. Interviews were videotaped and transcribed, serving as the primary data sources. Field notes and products created by the interviewees were consulted as secondary data.

Interview Questions and Protocol

To ground the research interviews in previous scholarship, the researcher developed a synthesis of pest-related educational benchmarks from the disciplines of science (American Association for the Advancement of Science, 1994) and agricultural education (Leising & Zilbert, 1994). Members of Michigan State University's (MSU) Departments of Science Education and Agricultural and Extension Education (AEE) reviewed questions and protocol. The interviews began with questions about the background of each student. To link the conversation in a familiar context, interviewees were provided a cheeseburger from a nationally known fast food chain. The researcher hoped that by starting from this common basis informants could easily express their ideas about the steps this familiar food goes through on its way from production to consumption.

Interviewees were asked to separate the cheeseburger into its component parts so that the complex food could be more easily analyzed. Questions required interviewees to reflect on the lettuce and meat; these two foods were selected because they were the least processed of the cheeseburger's components. Further questions probed participant understandings of three pest-related benchmarks.

Analysis of Data

In this study two different strategies were used to analyze data. First, demographic information was reported descriptively. The second strategy used Hogan and Fisherkeller's (1996) strategy for representing highly complex student thinking to answer research objectives pertaining to agri-food system understandings.

Analysis of data involved four phases. First, the researcher developed expert propositions related to three benchmarks and associated subconcepts. These propositions were validated by MSU's Science Education and AAE faculty. Anderson (1995) suggests clinical interviews be limited in terms of the organization of academic knowledge and the language needed for discourse about the academic knowledge. With this in mind, expert propositions and goal conceptions for 5th grade students were based on synthesis of science and agricultural education benchmarks (Trexler, 1997a). Table 1 lists the key concepts, benchmarks, and language needed to engage in discourse about the benchmark.

Table 1. Key Concepts, Benchmarks, and Language.

Key concepts	Benchmark	Language
How do humans manage crops to promote growth?	Describe how crops may be lost to pests.	pest, damage, loss
	Explain how crops are protected from weeds and pests.	kill, poison, crop protection, chemicals, pesticides, poisons, barrier
	Describe the positive and negative impacts of using poisons (pesticides) to protect crops.	poisons, harmful, benefits, costs, profit, positive, negative, labor, resistance, disease, increase, decrease

In the second phase of analysis, raw data from student interview tapes were analyzed by generating conceptual proposition maps. These maps served as summary portrayals of student thinking for each benchmark (West, Fensham, and Garrard, 1985). Finally, maps were verified for accuracy by comparing them repeatedly to interview tapes of informants. At a minimum, each tape was viewed three times.

Phase three focused on coding student responses. The sophistication of student thinking about a given benchmark--as represented in the conceptual proposition map--was judged along two dimensions: quality (compatibility) and depth (elaboration of response) by comparison with expert propositions. Student understandings were assigned codes based upon this comparison scheme (Table 2).

The final phase of analysis sought confirming and disconfirming evidence of patterns among individuals (Miles and Huberman, 1994). This was accomplished by two procedures. First, each benchmark was analyzed across individuals. And second, holistic portraits of student thinking were analyzed to ascertain how understanding or misunderstanding of subconcepts might influence understanding of another benchmark.

Table 2. Coding Scheme to Compare Propositions with Experts.

Code	Description
CE (Compatible Elaborate)	Statement concurs with the expert proposition and has sufficient detail to show the thinking behind the concepts articulated.
CS (Compatible Sketchy)	Statement concurs with expert proposition but lacks essential details. Pieces of facts are articulated but are not synthesized into a coherent whole.
CI (Compatible/Incompatible)	Sketchy statements are made that concur with the proposition but are not elaborated upon. At other times, statements contradict proposition.
IS (Incompatible Sketchy)	Statements disagree with the proposition but provide few details, and are not recurring. Responses appear to be guesses.
IE (Incompatible Elaborate)	Statements disagree with proposition, and students provide details or coherent, personal logic supporting them. Same or similar statements/explanations recur throughout the conversation.
N (Nonexistent)	Students respond "I don't know" or do not mention the topic when asked a question calling for its use.
ø (No evidence)	A topic is not directly addressed by a question, and students do not mention it within the context, of response to any question.

Findings and Discussion

Research Objective 1: Informants' backgrounds and experiences.

Background

Table 3 shows data relative to informant background including gender, race, school, and geographic location of where they were raised, parental occupation.

Table 3. Elementary Student Background Data.

Name	Gender	Race	School	Raised	Parents' Occupation	Socio economic Status
Jay	Male	African American	Public School	Lansing	Father- Janitor Mother - State civil servant	Lower middle class
Jill	Female	European American	Catholic School	Lansing	Father- State civil servant	Lower middle class
Tom	Male	European American	Public School	Idaho, Oregon, and Lansing	Father- Science teacher	Lower middle class
Jim	Male	African American	Lutheran School	Detroit	Mother- Word processor	Lower class
Mona	Female	African American	Lutheran School	Detroit	Father- Airport porter Mother - Pre-school teacher	Lower class
Sara	Female	African American	Public and Lutheran School	Detroit	Stepfather- Machinery repair Mother- Shipping clerk	Lower class
Tim	Male	European American	Public School	Suburb of Lansing	Father- Mental health administrator Mother- Secretary	Upper middle class
Ema	Female	European American	Public School	Suburb of Lansing	Father- Pharmacist Mother- Pre-school teacher	Upper middle class
Liz	Female	European American	Public School	Suburb of Lansing	Father- Engine designer Mother- Teachers' aide	Upper middle class

There were nine elementary students in this study: five were female and four were male. They were of European or African ancestry and came from urban and suburban locations. Four student informants attended parochial school; the remainder were in public schools. The parental occupations ran the gamut from janitor to pharmacist. Informants were evenly divided by SES groups: lower, lower middle, and upper middle classes.

One of the students who lived in an urban location had once lived in rural areas in western states. The other informants had only lived where they were interviewed. The fact that one student lived in various places while growing up is of import to this study. He cannot be compared with the other urban students for purposes of generalizations.

Experience

Table 4 summarizes experiences of elementary students.

Table 4. Food and Agriculturally Related Experiences.

Name	Shopping	Cooking	Gardening	Farming
Jay	Yes , mother	Sometimes cooks steak	Yes, with mother	No
Jill	Yes, mother	Doesn't cook	No	No
Tom	Yes, mother	Sometimes macaroni and cheese	Yes, with father	No
Jim	Yes, mother	Mixes things for grandma	Yes, with grandma	No
Mona	Yes, mother	Cooks cookies with mom and had cooking class	Tried to grow plants, they died No vegetables	No
Sara	Yes, mother	Helps mother sometimes	No	No
Tim	Yes, mother	Cooks with canned food	Yes, with grandma	No
Ema	Yes, mother	Cooks macaroni	No	No
Liz	Yes, mother	Cooks cookies, never meals	Yes, with mother	No

All elementary students had shopped with their mothers for food. Most had helped out in the kitchen, but they did not play a major role in food preparation. Only one elementary student had had a cooking class in school. Relative to gardening, only two students had never been involved in growing food. No elementary student informant had ever worked on a farm, but one had lived in areas near farms.

Research Objective 2: Student understandings of pest-related benchmarks

The second research objective focused on elementary student understanding of the benchmarks related to a) crop loss due to pests, b) crop protection, and c) the impacts of using poisons to protect crops. Codings of elementary student understandings for the benchmarks are found in Table 5. Detailed descriptions of the findings follow.

Table 5. Elementary Student Understanding of Pest-Related Benchmarks.

Benchmarks	Jay	Jill	Tom	Jim	Mona	Sara	Tim	Em	Liz
1. Describe how crops may be lost to pests.	CS	CS	CS	CS	N	N	CS	CE	CS
2. Explain how crops are protected from weeds and pests.	CS	CS	CS	CS	N	N	CS	CS	CS
3. Describe the positive and negative impacts of using poisons to protect crops.	N	N	CS	CS	N	N	N	CS	CS

ø--No evidence; N--Nonexistent; IE--Incompatible Elaborate; IS--Incompatible Sketchy; CI--Compatible/Incompatible; CS--Compatible Sketchy; CE--Compatible Elaborate.

Benchmark A. Describe how crops may be lost to pests.

In Benchmark A "Describe how crops may be lost to pests" informants were coded into three classifications: Compatible Elaborate, Compatible Sketchy, and Nonexistent (Table 5). Only Ema was Compatible Elaborate in her description of the two parts to this benchmark--weeds and animal pests. Jay, Jill, Tom, Jim, and Tim were Compatible Sketchy; and Mona and Sara were Nonexistent. Ema, Liz, and Tim said crops needed to be protected from weeds. Tim explained in detail about how dandelions "stole" water from trees, while Liz's response to why weeds were removed from her home garden was based only on them being "tacky." She lacked an understanding of how crops are lost to pests. Liz described her home garden (L = Liz and I = Interviewer):

L- If it has rocks and stuff in it, like in the dirt, and in it, or weeds or something. Like in our garden, we always pick out the weeds and like old roots and stuff.
I- Can you tell me, why do you think you pick out the weeds in your garden?
L- So then, they don't grow bigger and, I don't know, so it looks better.
I- What would be wrong if they grew bigger?
L- The garden would look really tacky.
I- OK, so it has to do with looks.
L- Because weeds aren't the best things to have, because they like, I don't know. We usually pick them out in our garden because they'll look bad.

Even though Tim and Liz held a much more elaborate schema relative to weed pests, they did not have a Compatible Elaborate understanding of the goal conception and were coded Compatible Sketchy. Interestingly, their contemporaries did not mention weeds at all.

Relative to animals as pests to human crops, only Ema and Liz stated that these pests could be wild animals, rodents, and insects. Jay, Jill, and Tim spoke only of rodents, and Tom and Jim only of insects. Additionally, Tom, Jim, Ema, and Liz knew that these animals could affect crops by eating and nesting in them, while Jay, Jill, and Tim only mentioned animals eating

plants--this may be logical as they viewed animals affecting plants as large. Interestingly, no informant mentioned birds as pests to crops. In addition, neither Mona nor Sara spoke of pests at any time during the interview.

Benchmark B. How are crops protected from weeds and pests?

All informants--with the exception of Mona and Sara--were coded Compatible Sketchy. Mona and Sara did not mention pests in Benchmark A. Therefore, they did not have the requisite background to understand that crops needed to be protected from pests--they were coded Nonexistent. In the expert conception for this benchmark, three methods were listed to protect crops: a) establishing barriers to pests, b) killing pests with poisons (pesticides), and c) breaking pest life cycles through management techniques. No informant spoke of all three methods, but one--Tim--added the use of scarecrows and decoy snakes.

Elementary student understanding of this benchmark was dependent upon their knowledge of pests. Because Tim and Ema knew that weeds could be a problem to growing crops, they discussed the need for their removal. However, they did not mention using chemical compounds--herbicides--to rid gardens and fields of these pests. Other explanations of how crops are protected from pests were equally based upon student past understanding of what pests were. For example, Tim, Ema, and Liz stated that animal pests could be both rodents and insects, while Jay and Jill only mentioned rodents. Both groups stated that fences could be used to prevent pests from plaguing crops. On the other hand, Tom and Jim, because they viewed pests exclusively as insects, stated that sprays (pesticides) could be used to protect crops by killing bugs.

The notion of using a spray to fend off insects was also shared by Tim, Ema, and Liz--they stated that insects were pests to crops. Ema explained that crops were protected by the application of sprays:

I- Is there anything that the person who is growing this might need to protect the lettuce from?
E- Um, bugs . . ..
I- Tell me about that.
E- The bugs, there are certain bugs that like lettuce and vegetables and things and other things like rabbits that like to eat them. And they might have to put up like a cage or something around them to help them.
I- Can you tell me about the bugs? What would they do?
E- They eat the lettuce. They, I am not sure, they eat the lettuce.
I- OK, with these bugs eating the lettuce, is there anything that the farmer might do to protect the lettuce?
E- Yeah, they could spray the lettuce.
I- With what?
E- With like bug spray or something.
I- What does that do?
E- It keeps bugs away from, it kills the bugs.

No informant mentioned management techniques such as crop rotation to control pests.

Benchmark C. Positive and negative impact of using poisons to protect crop.

The expert conception for Benchmark C was very complex and described the positive and negative impacts of using poisons (pesticides) to protect crops. The positive impacts stated were the: a) reduction of time and labor, b) increase in crop yield and its resultant decrease in the price of food, and c) decrease in human disease caused by pests. Conversely, negative impacts included the: a) expense of purchasing and using pesticides, b) contamination of the environment resulting in morbidity and mortality to living things, c) resistance to pesticides by pests and resulting in dependence on products that no longer serve their purpose, and d) the move away from sustainable practices because of a reliance on "quick fixes" such as pesticides. No informant included more than one positive or negative impact of pesticides. In fact the majority (Jay, Jill, Mona, Sara, and Tim) were coded Nonexistent for this benchmark. The remaining Compatible Sketchy informants (Tom, Jim, Ema, and Liz) all stated that sprays would help plants by preventing their destruction, thereby leading to an increased yield. Thomas also mentioned that this would increase profits for the farmer. On the negative side, Tom, Jim, and Liz mentioned that sprays could result in contamination of foods. Liz explained that people might be allergic and plants might not tolerate the material. ey can't [take] the stuff that you spray on it.

Jim said that people would have to wash their produce, and Tom commented that a disadvantage would be harm to plants as well as to humans.

I- You talked about, using those things that protect the plants from like bugs. Can you think of, so what's good about that?
T- It kills the bugs and some of the bugs won't eat the plant. Bugs eat plants.
I- Anything that's a disadvantage to that?
T- It could harm the plants, say they put too much on it and the people grind it and eat it. It might harm the person who eats it. If it's too much on it.
I- Do you ever think about that? Do you have . . ..
T- Yeah. Sometimes. If it's like on fruit, because they do spray on fruit. And then you always have to wash it off before you eat it, 'cuz it could have, it's, it's poisonous to you probably. And it's poisonous to bugs.
I- So do you always wash off your fruit?
T- Yeah. Strawberries and apples, something like that.

It is noteworthy that no informant used the term "pesticide" during the interviews. "Bug spray" and "sprays" were commonly used. Additionally, Liz and Jim used the analogy of OFF™--a repellent--to discuss these substances. They didn't mention the killing of these insects.

Research Objective 3: Commonalties with regard to informant backgrounds and experiences and their understandings of pest-related benchmarks.

The study's third objective assessed commonalties among informants with regard to background and experiences and their understanding of pest-related benchmarks. The goal was to determine if associations between these variables were apparent. These variables included demographic background and food and agriculturally related experiences.

Groups of informants displayed marked differences related to their understanding of the benchmarks. The European American, upper middle class SES group members were the only informants to describe weeds as pests that farmers might need to protect crops against. Two informants from this group--Tim and Ema--explained that the weeds would compete for growth requirements--specifically light and water--with other, more desirable plants. Ema explained that crops are lost to weeds because they competed with crops for space and for growth requirements.

I- You talked about plants growing and blocking out something.
E- Yes, there might be other weeds or plants or something that are growing too close and the leaves might block out the sunlight from the lettuce and make it die, because it doesn't get much sunlight.
I- So what would the person who is growing the lettuce do?
E- Probably chop down the weeds or before they grow the plants, if it's like has another vegetable a little farther.

Conversely, urban Detroit informants who had never gardened had no schema related to pests. They did not express any understanding of: a) how pests (insects or weeds) affect crops, b) how crops might be protected from pests, or c) the impacts of using pesticides.

Conclusions

1. Out-of-school experiences were the strongest determinant of informant ability to engage in discourse that was compatible with experts. This is supported by the fact that informants who held understandings most compatible with expert conceptions, time and again, related their discourse to personal experiences and not school-based learning.

2. "Compatible Sketchy" codings were the most common. This indicates that informants held incomplete understandings of science and agricultural education benchmarks. These incomplete understandings were often found in concepts that required informants to make connections between scientific, societal, and technological concepts.

3. Informants lacked language to accurately articulate an understanding of benchmarks. This is noteworthy because Fine (1990) suggests that humans, as social beings, use "language as the primary shaper of meaning" (p. 129), and because Cazden (1988) argues that speech unites the cognitive and social" (p. 1). Without language, then, there can be no conveyance of meaning. Thomson (1996) found that adult food consumers lacked language to express their thoughts about the agri-food system.

4. Urban, non-gardening students appeared to lack a schema for pest-related benchmarks. One might speculate that this resulted from their lack of experiences with growing food and from a dearth of opportunities to travel and gain a broader perspective.

5. Most students lacked knowledge and understanding of pests and their control. Without this schema, there is no way to intelligently weigh the positive and negative effects of using pesticides and other crop technologies, e.g., GMOs.

6. There appear to be core biological concepts (plant and animal growth needs, competition among organisms, etc.) that undergird other more complex concepts that scaffold an understanding of pest-related benchmarks. Without this initial structure, students cannot build a foundation for learning.

Recommendations

Further research can shed light on pest-related understandings of elementary students. Specifically, additional use of this study's research protocol by other researchers with similar, but different groups, can lead to generalizability of findings. These studies might target areas where "sketchy" (incomplete) conceptions are present.

Implications

1. Clinical interviews were fruitful in surfacing informant understandings of pest-related benchmarks; therefore, this methodology has implications for researchers as they seek to ascertain what people "understand" (Frick, Kahler, & Miller, 1991; Frick & Wilson, 1996) about the agri-food system. Dewey (1933) argues that to "understand" is a personal affair, one that entails an individual's struggle to grasp meaning. The survey methodology that currently dominates the agricultural education discipline cannot readily ferret out idiosyncratic cognitive structures.

2. Students held little knowledge of weeds, and the majority did not understand that weeds compete with crops for sun, soil nutrients, space, and water. This underscores the need for curriculum designers to include these topics in curricula. It is of particular import that members of society understand these concepts as they weigh the costs and benefits of pesticide use. This is increasingly important because herbicides are the most widely used pesticides in the United States (McEwen & Stephenson, 1979; Spindler, 1983) and because of the growing debate over herbicide-resistant GMO crops (Hillyer, 1999).

3. Societies of experts--such as university agricultural and science educators--may find this study of interest as it underscores the need for cooperation between them. Specifically, developmental ideas are missing or are seldom linked in the curricular frameworks of both disciplines. This was apparent as the researcher developed a synthesis for each discipline's pest-related benchmarks. These ideas are foundational to developing a sequenced understanding that builds on less complex subcomponents. Pesticide use serves as an illustrative example. To understand why humans use this technology one must understand that: a) humans are animals that compete for food with other animals, e.g., insects, rodents, etc.; b) animals have growth requirements (food, water, shelter, air, space); c) these growth requirements are in limited supply, d) humans select certain plants and animals to grow for food; e) animals and plants that humans grow can be food for competitors; f) humans, to control animals and plants that destroy their food, employ technologies that kill them, limit their number, or prevent them from reaching the crop they choose to grow; and g) humans must weigh trade-off of the use of technologies--such as pesticides--in regard to health and safety, and the environment.

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Elementary Student Understandings of Pest-Related Science and Agricultural Education Benchmarks

A Critique

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Let me begin these comments by stating I am a quantitative researcher not a qualitative researcher. Some individuals have stated that case studies have the following disadvantages: oversimplification, exaggerations of the facts; they are unscientific, opportunistic, and unrepresentative; and they are partial accounts masquerading as full accounts. While this may be true, I have tried to minimize my bias by consulting several qualitative references and with colleagues experienced in qualitative research methods. I will also use this same critique for both research articles by this author as the related literature review for both were identical with the exception of one paragraph and the methodology was the same. I might add, it appears inconsistent that the same related literature base can be used for both elementary students and prospective elementary teachers.

The author uses a fair amount of jargon in the paper with such words as idiosyncratic understandings, mental schema, and benchmarking. From the related literature cited, the author was interested in measuring student understandings of the risks and benefits of complex agricultural systems. He says, "Decisions about complex societal and environmental issues – such as trade-offs with the use of pesticides and GMOs – require theories to explain how people come to learn about complex interrelationships." This I suggest is a problem in the conduct of the study. Why would anyone expect fifth grade students or prospective elementary teachers to understand the complex scientific and technological interrelationships surrounding these issues? I would suggest there are Ph.D.'s in those very fields that do not yet fully understand the interactions that occur. To expect those not trained nor experienced in agriculture to understand these issues sets the research up for failure before it begins.

Likewise, I am not sure the objectives of the study can be met due to the aforementioned comments. The author does acknowledge that clinical interviews need to be limited in terms of the organization of academic knowledge and the language needed for discourse about the academic knowledge. However, the same key concepts, benchmarks, and language needed to engage in discourse about the benchmark were used for both fifth grade students and prospective elementary teachers.

Lastly, I would like to have seen much more detail in the methodology section of the paper. To help establish internal validity it would have been helpful had the author provided more detail about strategies such as triangulation, member checks, long-term observation, peer examination, and researcher biases. External validity could have been enhanced had the author provided a rich, thick description of the situation so others could match the research situation, had provided more detail relative to how typical the individuals in the study were with others in the class, and had used multisite designs. Lacking such detail, the reader is left to wonder about these research threats.

In summary, while I applaud the author for trying a qualitative approach to developing new theory, I would suggest this paper was premature for this conference. At best it appears to be a work in progress and as a result adds little if anything to the literature base.

Agricultural Employment in the Illinois Food, Fiber, and Natural Resource System

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Introduction

Agriculture has always been a central component of the lives of Illinois citizens and the economy of the state. The fertile soil, adequate climate, excellent infrastructure, good marketing opportunities and a productive work force are only a few of the many resources that allow Illinois to be recognized as a world supplier of food, fiber, and natural resources. The Agriculture Food, Fiber, and Natural Resource (FFNR) system is a widespread and progressive industry that employs a significant proportion of individuals in the state of Illinois. It plays a crucial role in the history of the state and continues to contribute to the state's economy. Everyone in the state of Illinois is impacted, in some way, by the FFNR system.

According to the Illinois Agricultural Statistics Service (IASS), food and agricultural product manufacturing and processing contribute significantly to Illinois' economy. Because of this contribution, Illinois currently ranks high among the leading states in food and agricultural processing companies, meat packing, soybean processing, dairy manufacturing, corn processing, feed milling, ornamentals, vegetable processing and many others. In addition, there are approximately 1,400 food companies located in Illinois, ***and*** Illinois also ranks number one among all states in the production of ethanol (IASS, 1998).

The FFNR system extends far beyond the farm and involves the interaction of individuals and institutions with contrasting and often competing goals, which offer a wide array of employment opportunities. These employment opportunities come from ten main categories entitled: agricultural production, agricultural services, forestry, food processing, textiles, eating places, wholesale and retail, transportation, farm machinery and construction, and service industries. Relationships among the ten categories shift somewhat over time as new technologies spawn economic, social, and political changes.

In the late 1980's, the National Association of Supervisors of Agricultural Education reported that the image of the agricultural instructional programs at the secondary and post-secondary level must be changed to reflect a scientific and futuristic nature. It was viewed that the future of agriculture depends upon the willingness of the agricultural education profession to analyze current programs and adjust them to meet the changes of advancing biotechnology and information technology. Technological gains that have been either achieved or are just over the horizon, include computerized monitoring, gene manipulation, robots, and computerized control of farm systems, to name a few. Information technologies are predicted to reduce barriers for entry into production agriculture and to increase marketing efficiency. Basic plant and animal research, food and fiber processing, and agribusiness management and marketing will provide the most significant

employment opportunities for graduates. In contrast, graduates seeking positions in production agriculture will encounter strong competition for limited employment opportunities (NASAE, 1987).

During the past twenty years a plethora of attempts have been made at the state and national level to identify and report the number of persons employed in occupations related to the agriculture-FFNR system. (Sands, Swanson, & Herbst, 1980; Pepple, Law, & Smith, 1986; ISBE/DAVTE, 1987; Zurbrick, 1986; Coulter, Stanton, & Goecker, 1986; Schluter, Lee, & Edmondson, 1986; Edmondson & Schluter, 1986; Pepple, 1991)

In 1986, the Illinois Department of Employment Security reported a civilian work force of 5,648,000 in Illinois (representing all workers, including unpaid family workers and the self-employed, which account for a total of 350,000 workers). In a labor market study conducted by Pepple, 1,153,798 workers were identified in the Illinois Food and Fiber System in 1986 (Pepple, 1991). This included workers involved in producing, assembling, marketing, and processing raw farm products and distributing those products to domestic and foreign consumers. At that time, agriculture-based employment accounted for 20.4 percent of Illinois civilian employees (Pepple, 1991). It is realistic then to hypothesize that because of the vast growth and technological advances that are consistently occurring in the Illinois FFNR system, career opportunities for high school and college agriculture graduates will accelerate.

The executive summary of the Reinventing Agricultural Education for the Year 2020 initiative entitled, *"A New Era in Agriculture,"* reports that the national mission of agricultural education is to prepare students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resource system (National Council for Agricultural Education, 1998). This mission statement, along with improved recruitment strategies and expansive opportunities in the FFNR system, are supported by current statistics reported in the publication entitled, *"Illinois Agriculture Education Growing Careers In The Food And Fiber For The 21st Century."* These statistics depict approximately 18,000 students studying agricultural education in over 300 Illinois high schools. This represents a 49 percent increase in agricultural education enrollment since 1990 (Facilitating Coordination in Agricultural Education, 1998). The future success of this thriving and vital industry in Illinois lies in the hands of high school and college graduates. It is essential that graduates be well educated and well prepared for the intricate competencies required by many employment opportunities within the FFNR system. However, before educators design programs to educate these individuals, we must first determine how many of these individuals are currently employed and how many additional employees will be needed. This study attempts to accomplish that goal.

The complexity of the FFNR system has presented a challenge to gather, compile, and analyze available labor market information. This challenge of obtaining labor market information is due to the fact that most of this information does not reflect areas of the FFNR system other than farming. Inadequacies exist because (1) many agricultural jobs are not reported through "official" channels, (2) some narrowly define "agriculture" as farming, (3) self-employed, small businesses, and entrepreneurial situations are frequently deleted from reports due to confidentiality reasons, and (4) many agricultural jobs, other than production, are compiled as nonagricultural (Pepple, 1991). This challenge existed in 1988 for Pepple's labor market study and continues to exist today. Therefore, it became necessary to develop a new approach for analyzing and reporting labor market information as it relates to the FFNR system in Illinois. Again, this study sought to accomplish this task.

Purpose and Objectives

The primary purpose of this study was to identify and report the number of persons employed in occupations related to the agriculture FFNR system for the year 1996, and projected to the year 2006. Specific research objectives included:

1. To determine employment data trends from 1986 to 1996, for the Illinois FFNR system.
2. To identify the current employment base in agriculturally related industries for the Illinois FFNR system.
3. To estimate the employment base in agriculturally related industries in the Illinois FFNR system for the year 2006.

Methods and Procedures

The Illinois Department of Employment Security (IDES) is the official agency for collecting and reporting state employment data. IDES uses the Standard Industrial Classification (SIC) system that is a nationally recognized system developed for use in defining and classifying occupations. This employment data is made available to agricultural education program planners through the National Occupational Information Coordinating Committee/State Occupational Information Coordinating Committee NOICC/SOICC as designated in the Carl D. Perkins Vocational Education Act of 1984. As noted in Figure 1, agriculture is the central point from which other FFNR system industries form their services and products. These industries may be classified as input or output in their relation to agricultural production. Therefore, characteristics and types of agricultural industries in Illinois that contribute as input or output industries help determine the total size of the FFNR system (Pepple, 1991).

FOOD, FIBER AND NATURAL RESOURCE SYSTEM

Equipment		
Seed		**Food Processing**
Fertilizer		**Marketing Services**
Pesticides	**Farmers**	**Advertising**
Financial Services	**Farm Workers**	**Food Distribution**
Input Services	**Production Agriculture**	**Output Industries**

Figure 1. Agricultural production is the central point of which other food, fiber, and natural resource system industries form their services and products. Adapted from the 1988 Agricultural Employment Data for the Illinois Food and Fiber System Report.

In identifying the Illinois FFNR system, researchers followed the estimating procedure of employment used in the Pepple study reported in 1991. This procedure focuses on the input/output analysis utilized to track the direct and indirect linkages among economic activities. The U.S. I/O tables disaggregate all economic activities into 79 economic sectors. This includes a range of

activities from farming, food processing, transportation, and wholesaling and retailing. Specific job titles within the 79 sector categories include a wide variety of activities as specified in the Dictionary of Occupational Classifications Manual. All of the specified titles directly or indirectly support the food, fiber, and natural resource system. As a result, the output satisfies the final demand in the economy.

The Pepple study (1991) utilized a panel of experts to review the SIC manual that revealed a total of 40 SIC industry groups in Illinois as having a percentage of their establishments associated with the food and fiber system. The panel identified occupations and aggregated them into eight main Occupational Employment Statistics (OES) classification categories—managers and owners, professional and technical occupations, machine operative occupations, mechanics and repairers, production and maintenance occupations, construction and repair occupations, sales and services occupations, and clerical occupations. These eight main classification categories continue to be used for occupations related to the Illinois FFNR system and were used in this study.

In November 1998, researchers met with representatives from the Illinois Department of Employment Security (IDES) to gather data pertinent to this project. Data files containing Standard Industrial Classification (SIC) codes that represent the Illinois FFNR system occupations were downloaded into computers and analyzed using SPSS software.

The statistical procedure used in calculating estimated employment for specific OES occupations at the 3-digit SIC level is illustrated in Figure 2.

Where:

E = occupational estimate
ek= employment for a specific occupation reported by industry k
pk= sum total employment reported by industry k
wk= weight for industry as reported by industry k
M= benchmark employment for the cell as of the end of 1996, reported at the 3-digit SIC level
n= number of industries within each sector of the FFNR system in Illinois
I= area indicator derived from Illinois State Board of Education Regions

Occupational Estimate:

$$E = \left[\left(\frac{w_{ki} M}{\sum_{k=1}^{n} p} \right) \sum_{k=1}^{n} e_{ki} \right]$$

Figure 2. Formula for determining occupational estimates.

Results

IDES data files reported a civilian work force of 6,167,576 in 1996 and estimated a civilian work force of 7,070,747 in 2006 (representing all workers, including unpaid family workers and the self-

employed). This study identified 1,510,454 workers in the Illinois FFNR system in 1996, and 1,652,260 in 2006. This includes workers involved in producing, assembling, marketing, and processing raw farm products and distributing those products to domestic and foreign consumers. Agricultural-based employment accounted for 24.4 percent of Illinois civilian employment in 1996 and 23.4 percent in 2006. When comparing the agricultural based employment in 1986 to 1996 totals, an increase of 356,656 workers were identified in agricultural occupations in the Illinois FFNR system. This indicates that of the total increase in the Illinois civilian workforce from 1986-1996, 68.8 percent represents workers within the agricultural industry.

As displayed in Table 1, employment in the Illinois FFNR system in 1996 was dispersed throughout the eight SIC industry categories. "Agricultural Production" had 128,987 employees (8.54%), "Agricultural Services" had 31, 276 employees (2.07%), "Forestry" had 267 employees (.02%), "Food Processing" had 96, 108 employees (6.36%), "Other Manufacturing and Non-Manufacturing" had 501,581 employees (33.21%), "Trade" had 481,965 employees (31.91%), "Transportation" had 55,292 employees (3.66%), and "Rest of the Economy" had 214,978 employees (14.23%).

Table 1 illustrates the employment trends in the eight major sectors from 1986, 1996, and 2006. The data in Table 1 suggest that employment in agricultural production, agricultural services, forestry, and food processing accounts for about 20 percent of jobs in the Illinois FFNR system. The majority of jobs, about 80 percent, are located in the remaining sectors, those being primarily "Other Manufacturing and Non-manufacturing" and "Trade."

The majority of establishments classified as the "Other Manufacturing and Non-Manufacturing" sector are corporations that lease, provide insurance, or lend to the industries that produce the food in the FFNR system. The industry categories are: SIC 154 General Building Contractors, SIC 769 Miscellaneous Repair Shops and Related Services, SIC 352 Farm and Garden Machinery and Equipment, SIC 611 Federally Sponsored Credit Agencies, SIC 615 Business Credit Institutions, SIC 616 Mortgage Bankers and Brokers, SIC 622 Commodity Contracts-Brokers and Dealers, SIC 623 Security and Commodity Exchange, SIC 633 Fire, Marine, and Casualty Insurance Carriers, SIC 651 Real Estate Operators and Lessors.

The Trade Industries (Table 2) provide a critical link in the FFNR system. These industries allow (1) wholesalers to sell equipment or food to distributors for retail distribution, and (2) retailers to sell the food or equipment to consumers. The trade industry categories are: SIC 508 Machinery, Equipment, and Supplies-Wholesale, SIC 514 Groceries and Related Products-Wholesale, SIC 515 Farm Product-Raw Materials-Wholesale, SIC 519 Miscellaneous Nondurable Goods-Wholesale, SIC 526 Retail Nurseries, Lawn and Garden Supply Stores, SIC 542 Retail Meat and Fish Markets, Sic 543 Retail Fruit and Vegetable Markets, and SIC 596/9 Miscellaneous Retail.

Table 1. Agribusiness Employment in Selected Sectors of the Illinois Food, Fiber, and Natural Resource System 1986, 1996 & 2006 .

Section	1986		1996		2006	
	Total Employment	%	**Total Employment**	%	**Total Employment**	%
1. Agricultural Production	104,273	9	128,987	8.54	128,500	7.78
2. Agricultural Services	24,183	2	31,276	2.07	36,061	2.18
3. Forestry	3,569	1	267	0.02	307	0.02
4. Food Processing	95,578	8	96,108	6.36	98,083	5.94
5. Other Manufacturing	385,561	33	501,581	33.21	528,777	32.00
6. Trade	356,561	31	481,965	31.91	567,779	34.36
7. Transportation	35,726	3	55,292	3.66	64,308	3.89
8. Rest of the Economy	147,925	13	214,978	14.23	228,445	13.83
Grand Total	1,153,797	100	1,510,454	100	1,652,260	100

Table 2. Estimated Total Employment in the Illinois Food, Fiber, and Natural Resource System in 1996.

OES Occupational Classification	Total Employment *	Agricultural Services	Forestry	Food Processing	Other & Non - Manufacturing	Trade	Transportation	Rest of the Economy
Managers & Owners (13%)	176,811	2,565	18	6,824	95,300	38,075	6,082	27,947
Professional & Technical (10%)	135,877	3,440	151	5,767	55,173	39,039	61	32,246
Machine Operative (9%)	125,617	2,439	39	22,105	15,047	53,016	30,901	2,070
Mechanics & Repairers (7%)	110,210	531	0	6,632	10,031	19,279	2,765	70,972
Production & Maintenance (10%)	143,809	16,412	31	34,982	25,079	38,557	9,400	19,348
Construction & Repairers (5%)	61,249	572	0	0	60,190	0	0	487
Clerical Occupations (25%)	340,004	3,753	17	13,070	165,524	109,888	4,977	42,775
Sales & Service (20%)	287,890	1,564	11	6,728	75,237	184,111	1,106	19,133
Total	1,381,467	31,276	267	96,108	501,581	481,965	55,292	214,978

*Total does not include Agricultural Production

Table 3. Estimated Total Employment in the Illinois Food, Fiber, and Natural Resource System in 2006.

OES Occupational Classification	Total Employment*	Agricultural Services	Forestry	Food Processing	Other & Non-Manufacturing	Trade	Transportation	Rest of the Economy
Managers & Owners	194,658	2,993	24	6,866	102,582	45,422	7,074	29,697
Professional & Technical	149,610	3,966	169	5,851	58,166	47,125	67	34,266
Machine Operative	141,905	2,957	43	22,332	15,863	62,455	35,970	2,285
Mechanics & Repairers	119,603	577	0	7,132	10,576	22,711	3,220	75,387
Production & Maintenance	158,567	18,751	35	35,291	26,439	46,558	10,932	20,561
Construction & Repairers	64,816	651	0	27	63,453	0	0	685
Clerical Occupations	371,855	4,147	21	13,240	172,381	130,589	5,788	45,689
Sales & Service	322,782	2,019	15	7,350	79,318	212,919	1,286	19,875
Total	1,523,760	36,061	307	98,083	528,777	567,779	64,308	228,445

*Total does not include Agricultural Production

In Tables 2 and 3, all identified occupations were consolidated into eight main Occupational Employment Statistics (OES) classification categories—managers and owners, professional and technical, machine operative, mechanics and repairers, production and maintenance, construction and repairers, clerical occupations, and sales and service. These tables provide a more precise view of **how** all identified agriculture careers relate to the FFNR system for 1996 and projected to 2006.

The total OES occupational employment distribution, displayed in Tables 2 and 3 for the years 1996 and 2006 respectively, as well as the data from the 1991 Pepple's study, was identified as Managers and Owners (13%), Professional and Technical (10%), Machine Operative (9%), Mechanics and Repairers (7%), Production and Maintenance (10%), Construction and Repairers (5%), Clerical Occupations (25%), and Sales and Service (20%). Tables 2 and 3 illustrate the estimated employment in these sectors, except for agricultural production. The current employment structure in agricultural production cannot be analyzed the same way the other sectors are analyzed because, by definition, agricultural production is already a part of the FFNR system.

Conclusions and Recommendations

In order to obtain accurate agricultural labor market information, cooperation must occur among all occupationally related entities. These entities include the State Occupational Information Coordinating Committee (SOICC), the Illinois State Board of Education, and especially the Illinois Department of Employment Security.

Labor market data can be used for many purposes. If this study were replicated over a defined period of time, labor market trends and projections may be estimated. This study is also significant to program planners in agricultural education as they continue to link course offerings and curricula to current and future job opportunities.

These data may be viewed as controversial due to the overlap of jobs and occupations in other program areas such as business, health, family studies, and industrial. Further, these data should not conclude that all employees in the FFNR system need extensive training in agriculture. In contrast, many jobs in the Illinois FFNR system only require training within the agricultural facility.

This study should be replicated every three years as IDES updates their labor market databases. This will allow for researchers to gain insight into trends and future projections for agricultural labor market data. Agricultural education program planners can utilize this data to continue to provide curricula that reflects demands of the job market to their respective programs.

A national study should be conducted to compare and display agriculturally related jobs across the nation. The procedures used in this study are based upon a USDA model and may be replicable in states that have a State Occupational Information Coordinating Committee and State Department of Employment Security.

It is imperative that the agriculture-food, fiber, and natural resource system be defined as an acceptable entity that includes agricultural production and all related input/output industries. Currently, a lack of agreement exists regarding a precise definition of "agriculture." All involved in the Agriculture Food, Fiber, and Natural Resource system must agree on a working definition of this boundless entity.

It is obvious that the Agriculture Food, Fiber, and Natural Resource system influences virtually very person in the state of Illinois. It is crucial that society not view agriculture and the farm as synonymous. During the past two decades agricultural occupations have changed significantly. Farming is no longer the only employment opportunity that supplies jobs for individuals interested in pursuing a career in the FFNR system. The challenge, for now and in the future, is to continue to study agricultural employment data that consistently supports the importance and variety of career opportunities in the FFNR system. Projections into the 21st century show significant growth of employment opportunities within most areas of agriculture industries. This study has been encouraging in providing a long-term positive viewpoint of career opportunities in all facets of the progressive Agriculture Food, Fiber and Natural Resource system.

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Agricultural Employment in the Illinois Food, Fiber, and Natural Resource System

Critique

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Completion of periodic manpower studies of current and projected employment needs is a prerequisite activity for developing quality agricultural education curricula and instruction. The authors are commended for establishing a framework for completing the study of the future employment needs in agriculture for Illinois. Though challenging to design and implement, the strategies used in this study may provide a pattern for others to follow for completing employment projections for agricultural occupations.

While reviewing the introduction and methods section, the reader cannot help but wonder if there are any additional literature and protocols used for estimating the number of persons employed within chosen occupations. Additional clear and concise demographic information (e.g., populations, major industries, rankings of agricultural commodities, number of agribusinesses and agri-industries, etc.) about the past, current, and projected populations and industries within Illinois may also provide a clearer context for the number of employees needed in selected agricultural occupations. Since this study is being used to inform the agricultural education programming strategies for the future, additional information about the past, current, and projected numbers of Illinois agricultural education students and teachers would be useful.

The findings of the study are presented in a clear manner in easily read tables. Considering the issue of projecting occupation needs, are the employment needs projected to grow or decline faster, the same, or less than the growth rates of the general population? A graphic or summary statistic showing the changes in the needs for each section of Table 1 may assist in understanding the real changes within the selected sectors of the Illinois, Food, Fiber, and Natural Resource System for 1986, 1996, and 2006. Regardless of the trends, what are the implications for agricultural education at the middle, secondary, and postsecondary, and college education levels? Will there be greater, similar, or declining needs for corresponding instruction? Considering the current cohort of Illinois agriculture teachers, will they be able to meet the increased demands for different types of instruction for newly emerging occupational areas in 2006?

The authors skillfully argued for changes within the system of reporting and estimating jobs within the food, fiber, and natural resource industries. As suggested by the authors, other states need to enter into a common process that can be used to inform programmers and policy-makers about the needs for agricultural education. Keep up the effort!!!

Assessing an Agricultural Education Program's Ability to Prepare Students for Careers in Teaching and Industry

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Introduction

Agricultural education programs have been changing their focus to encompass more diverse educational and career opportunities. Programs have been designed that develop a broad curricula to enhance opportunities to the market niche that will carry the profession into the 21st century. If agricultural education programs are to survive, they must be dynamic and able to adjust to new situations and environments that help to improve on-the-job effectiveness of future graduates (Scanlon, Bruening, Cordero, 1996).

For more than a decade this effort to find a niche has carried the profession. In 1989 Fuller, the distinguished lecturer at the professions' annual meeting, noted agricultural education programs must position themselves appropriately in the free market place of higher education and move beyond the preparation of teachers in agriculture. Several questions must be asked during this age of diversification. Will this diversification impact the quality of instruction students receive in a purely teacher preparatory program? Will diversified programs adequately prepare agricultural education graduates to succeed in their chosen career track? Will this diversification impact the ability of agricultural education departments to meet the needs of a broadened curriculum base, while at the same time not sacrificing the preparation of teachers which continues to be the primary focus of most departments?

Agricultural education programs at the university level continue to diversify to maintain enrollment levels for survival. Newcomb (1993) stated that departments that intend to prosper must scan the horizon and identify needs that are not being adequately served and foster relationships with new client groups.

Barrick (1993) developed a conceptual model for the Department of Agricultural Education at The Ohio State University. In the model, diversity played a major role in the scope of the program. He noted that while teacher preparation is the central mission of an agricultural education program, departments must encompass more than teacher preparation in the teaching/learning process.

Agricultural education programs must attract and retain high quality teachers to ensure a successful future (Vaughn, 1999). However, attracting and retaining certified agriculture teachers has been a problem facing the agricultural education profession through the years. Mattox (1974) concluded that a large percentage of prospective agriculture teachers, who had completed a teacher certification program, entered other careers or left teaching after a short period of time. In a study covering the past thirty years, Brown (1995) concluded that half of the agricultural education graduates from universities/colleges elected to not enter the teaching

profession. Therefore, it is imperative that departments attract high quality students eager to be successful in a variety of career opportunities.

Departments must maintain the satisfaction of students with varying interests and degree plans. Students in agricultural education programs must be prepared to enter the workforce in a variety of positions which further enhances the desire for programs in agricultural education departments to be effective at preparing students for diverse careers.

Purpose and Objectives

The purpose of this study was to evaluate the ability of an agricultural education program to effectively prepare students for both teaching careers and careers in the agriculture, food, and fiber industry. In addition, this study sought to assess the employability skills needed by agricultural education graduates and to evaluate the contribution of the agricultural education curriculum in developing these skills. The following research objectives were formulated to guide the study:

1. Describe the employment and occupational status of agricultural education graduates.
2. Assess the employability skills needed by agricultural education graduates.
3. Evaluate the contribution of the agricultural education curriculum to the development of employability skills.
4. Evaluate the agricultural education program's ability to prepare students for careers in teaching and industry.

Procedures

Population and Sample

The research method employed was descriptive survey. The population consisted of a census of agricultural education graduates ($N = 105$) at the University of Missouri from May 1989 through May 1998.

Instrumentation

A questionnaire with 67 forced-choice and three open-ended questions was developed by the researchers. The questionnaire consisted of six sections: educational status, occupational status, factors influencing position/occupational changes, educational experiences, program and advising, and open-ended questions. A panel of experts consisting of agricultural education faculty established content and face validity. Reliability was established by pilot testing the instrument with 16 senior agricultural education students. Cronbach's alpha coefficients ranged from .82 for the quality of academic advising section to .69 for the employability skills section.

Data Collection

The Dillman Total Design Method (Dillman, 1978) was followed for the data collection process. Postcards announcing the forthcoming questionnaire were mailed two weeks prior to mailing the complete questionnaire package which consisted of a cover letter, questionnaire, and pre-paid return envelope. Follow-up consisted of a postcard sent to all nonrespondents ten days after the mailing of the complete package. A second complete package was mailed to nonrespondents ten

days after the follow-up postcard. A total of 81 graduates responded for a response rate of 77%. Nonresponse error was controlled by comparing late respondents to on-time respondents as outlined by Krushat and Molnar (1993) who noted late respondents tend to reply similarly to nonrespondents. A comparison of these groups revealed no differences in the responses of late and on-time respondents.

Results

The first objective sought to describe the employment and occupational status of the agricultural education graduates. A majority of graduates (87.7%) were employed full-time while a limited number (3.7%) were continuing their education on a full-time basis (Figure 1). A few of the graduates (3.7%) were continuing their education part-time and were employed. The remaining graduates (4.9%) were classified as other and included employed part-time and caring for family/home full-time.

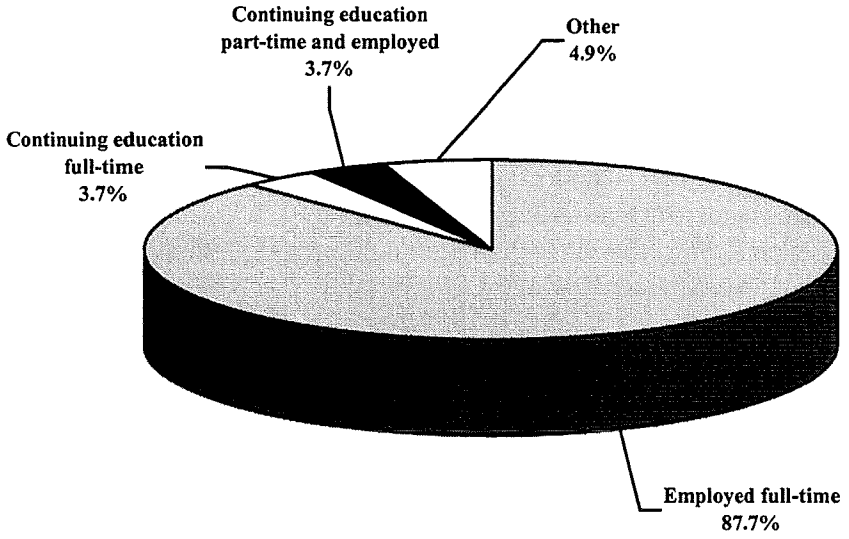

Figure 1. Employment Status (n=81)

The agricultural education graduates held a variety of occupations. The greatest number of graduates (63%) were employed as secondary agriculture teachers (Figure 2). Graduates also reported being employed in the areas of sales (12.3%), communications (6.2%), and industry education (7.4%). Industry education included extension, higher education, and technical support/service positions. A small number of graduates (3.7%) reported they were self-employed. Looking exclusively at graduates with teacher certification, approximately 90% taught secondary agriculture at some point in time and more than 75% indicated they were currently teaching in a secondary agriculture program.

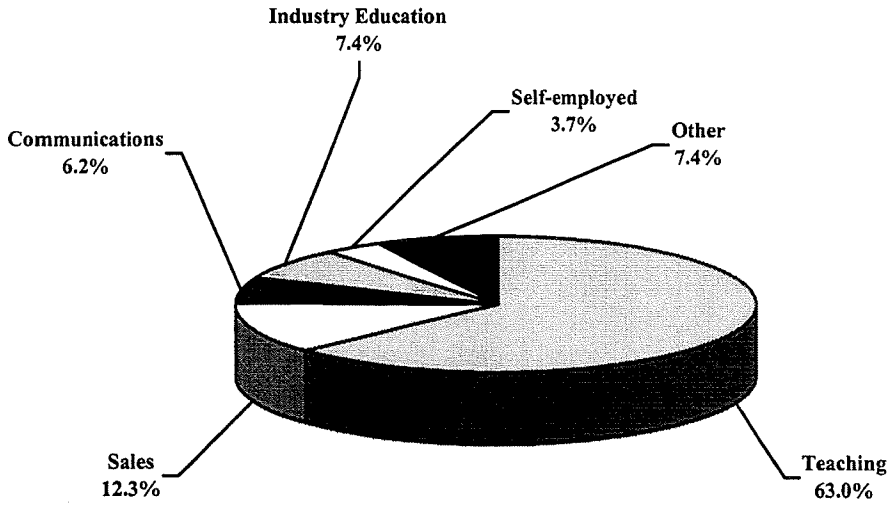

Figure 2. Occupational Status (n = 81)

The purpose of the second objective was to assess the employability skills needed by agricultural education graduates. Graduates were provided 15 employability skills and asked to indicate the level of importance of each skill to the success of their occupation. Graduates were categorized into two career field areas: teaching and industry (Table 1).

Graduates currently in a teaching career indicated that verbal communication (M = 3.9) was the most important skill for career success. Other high ranking skills needed for career success included leadership (M = 3.9), written communication skills (M = 3.8), getting along with people (M = 3.8), planning and completing projects (M = 3.8), analyzing information to make decisions (M = 3.8), defining/solving problems (M = 3.8), working cooperatively and as a team member (M = 3.7), working with people with differing attitudes and opinions (M = 3.7), and accessing and using a variety of information sources (M = 3.7).

Table 1. Employability Skills Needed by Agricultural Education Graduates.

Skills	Teaching (n=51) Rank	M	*SD*	Industry (n=29) Rank	M	*SD*
Using effective verbal communication skills	1	3.96	.20	2	3.83	.38
Using effective leadership skills	2	3.92	.27	8	3.66	.48
Using effective written communication skills	3	3.88	.33	7	3.72	.45
Getting along with people	3	3.88	.33	1	3.86	.35
Planning and completing projects	5	3.82	.39	3	3.79	.41
Analyzing information to effectively make decisions	6	3.80	.40	3	3.79	.41
Defining and solving problems	6	3.80	.45	5	3.76	.44
Working cooperatively in groups; working as a team member	8	3.78	.42	10	3.48	.69
Working with different attitudes and opinions	9	3.76	.47	5	3.76	.44
Accessing and using a variety of information sources	10	3.73	.53	9	3.55	.57
Appreciating and exercising the rights, responsibilities, and privileges of a citizen	11	3.49	.54	13	3.21	.73
Analyzing and drawing conclusions from various types of data	12	3.39	.63	10	3.48	.51
Understanding international (global) issues	13	3.22	.76	15	3.07	.65
Understanding the interaction of humans and the environment	14	3.10	.83	12	3.28	.70
Understanding and appreciating cultural and ethnic differences	15	3.06	.83	14	3.14	.74

Note. Scale: 1 = No Importance; 2 = Minor Importance; 3 = Moderate Importance; 4 = Major Importance

Graduates working in industry indicated that getting along with people (M = 3.8) was the most important skill for success in their occupations. Other important skills needed for success included verbal communication (M = 3.8), planning and completing projects (M = 3.7), analyzing information to effectively make decisions (M = 3.7), working with people with differing attitudes and opinions (M = 3.7), defining/solving problems (M = 3.7), written

communication skills (M = 3.7), leadership (M = 3.6), accessing and using a variety of information sources (M = 3.5), and working cooperatively and as a team member (M = 3.4).

The third objective sought to evaluate the contribution of the agricultural education curriculum to the development of the necessary employment skills. Graduates were provided 15 employability skills and asked to indicate the agricultural education curriculum's contribution to the development of each skill. Again, graduates were classified as employed in either a teaching career or industry career (Table 2).

Graduates teaching agriculture at the secondary level indicated that the agricultural education curriculum had between a moderate and major contribution toward developing skills in verbal communication (M = 3.4), written communication (M = 3.4), working cooperatively and as a team member (M = 3.3), leadership (M = 3.2), accessing and using a variety of information sources (M = 3.2), defining/solving problems (M = 3.2), planning and completing projects (M = 3.2), and analyzing information to effectively make decisions (M = 3.0).

Graduates with positions in industry indicated that the agricultural education curriculum had between a moderate and major contribution toward the developing skills in written communication (M = 3.6), accessing and using a variety of information sources (M = 3.4), verbal communication (M = 3.3), getting along with people (M = 3.3), working cooperatively and as a team member (M = 3.2), leadership (M = 3.2), planning and completing projects (M = 3.1), analyzing information to effectively make decisions (M = 3.0), and defining/solving problems (M = 3.0).

The final objective sought to evaluate the agricultural education program in preparing individuals for teaching careers and careers in industry. Two factors were considered, quality of the program toward career preparation and academic advising.

Graduates were provided 16 statements addressing the quality of the agricultural education program toward career preparation and were asked to rate the overall program according to each quality statement. Graduates were classified as employed in either a teaching career or industry career (Table 3).

Graduates in teaching careers indicated they were satisfied with the quality of the agricultural education program at the University of Missouri. The top five rated items for graduates in teaching careers were professional competence of the agricultural education faculty (M = 3.76), overall quality of the agricultural education program (M = 3.59), availability of required agricultural education courses (M = 3.55), job placement services (M = 3.53), and internship experiences (M = 3.49).

Table 2. Contribution of Agricultural Education Curriculum in Developing Employability Skills.

Skills	Teaching (n=51) Rank	M	*SD*	Industry (n=29) Rank	M	*SD*
Using effective verbal communication skills	1	3.47	.70	3	3.38	.73
Using effective written communication skills	2	3.43	.64	1	3.69	.54
Working cooperatively in groups; working as a team member	3	3.33	.68	5	3.24	.74
Using effective leadership skills	4	3.27	.70	6	3.21	.77
Accessing and using a variety of information sources	4	3.27	.78	2	3.41	.68
Defining and solving problems	6	3.25	.72	8	3.07	.88
Planning and completing projects	7	3.22	.61	7	3.17	.71
Analyzing information to effectively make decisions	8	3.06	.81	8	3.07	.75
Analyzing and drawing conclusions from various types of data	9	3.02	.73	10	2.93	.75
Working with different attitudes and opinions	10	2.96	.77	10	2.93	.84
Getting along with people	11	2.94	.83	4	3.34	.73
Understanding the interaction of humans and the environment	12	2.63	.77	13	2.62	.86
Appreciating and exercising the rights, responsibilities, and privileges of a citizen	13	2.57	.81	12	2.76	1.02
Understanding international (global) issues	14	2.33	.74	14	2.48	.63
Understanding and appreciating cultural and ethnic differences	15	2.22	.81	15	2.24	.79

Note. Scale: 1 = No Contribution; 2 = Minor Contribution; 3 = Moderate Contribution; 4 = Major Contribution

Table 3. Quality of the Agricultural Education Program.

Program Quality Statements	Teaching (n=51) Rank	M	*SD*	Industry (n=29) Rank	M	*SD*
Professional competence of agricultural education faculty	1	3.76	.48	2	3.48	.63
Overall quality of the agricultural education program	2	3.59	.54	6	3.21	.62
Availability of required agricultural education courses	3	3.55	.50	3	3.43	.57
Job placement services	4	3.53	.71	7	3.12	.73
Internship experiences	5	3.49	.80	1	3.61	.63
Support since graduation	6	3.42	.68	14	2.71	.96
Quality of instruction in agricultural education courses	7	3.35	.59	5	3.24	.58
Formal student evaluation of teaching in required courses	8	3.33	.62	11	2.96	.71
Organization of agricultural education curriculum	9	3.27	.67	10	3.03	.68
Quality of students	9	3.27	.60	4	3.34	.61
Availability of student/professional organizations	11	3.12	.71	13	2.86	.79
Quality of courses in preparing for graduate school	12	3.08	.80	12	2.94	.77
Quality of courses in preparing for employment	13	3.04	.72	8	3.07	.46
Availability of required courses outside agricultural education	14	2.90	.78	8	3.07	.59
Classroom facilities in agricultural education	15	2.78	.64	15	2.64	.83
Quality of computer support	16	2.76	.78	16	2.38	.77

Note. Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Excellent

Graduates with positions in industry indicated they were also satisfied with the overall quality of the agricultural education program. Graduates with careers in industry ranked their top five items as follows: internship experiences (M = 3.61), professional competence of agricultural education faculty (M = 3.48), availability of required agricultural education courses (M = 3.43),

quality of students in agricultural education (M = 3.34), and quality of instruction in agricultural education courses (M = 3.24).

Graduates with careers in both teaching and industry ranked quality of computer support (M = 2.76, teaching; M = 2.38 industry) and classroom facilities in agricultural education (M = 2.78, teaching; M = 2.64, industry) as the two weakest program quality items.

Graduates were provided six statements addressing advising and were asked to indicate their level of satisfaction with the advising they received while in the program. Again, graduates were classified as employed in either a teaching career or industry career (Table 4).

Table 4. Quality of Advising.

	Teaching (n=51)			Industry (n=29)		
Advising Quality Statements	Rank	M	*SD*	Rank	M	*SD*
Opportunities for interaction with the agricultural education faculty	1	3.63	.66	1	3.59	.63
Adviser's interest in me as a person	1	3.63	.77	1	3.59	.63
Availability of adviser	1	3.63	.69	3	3.55	.63
Adviser's help in planning my degree program	4	3.40	.73	5	3.17	.71
Quality of career advising	5	3.28	.76	7	2.86	.76
Appropriateness of referrals to other campus resources by adviser	6	3.20	.75	4	3.26	.75
Clarity of degree requirements	7	3.04	.85	6	3.07	.80

Note. Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Excellent

Graduates in teaching careers indicated overall they were satisfied with their advising ranking it somewhere between good and excellent on all quality statements. Graduates in teaching careers ranked their top five as follows: opportunities for interaction with the agricultural education faculty (M = 3.63), adviser's interest in me as a person (M = 3.63), availability of adviser (M = 3.63), adviser's help in planning my degree program (M = 3.40), and quality of career advising (M = 3.28).

Graduates with industry positions indicated they were also satisfied with their advising. Opportunities for interaction with the agricultural education faculty (M = 3.59), adviser's interest in me as a person (M = 3.59), availability of adviser (M = 3.55), appropriateness of referrals to other campus resources by adviser (M = 3.26), and adviser's help in planning my degree program (M = 3.17) were ranked as the top five advising quality statements by graduates with careers in industry.

Conclusions and Recommendations

Approximately 95% of the agricultural education graduates were gainfully employed, employed and continuing their education part-time, or continuing their education full-time. The remaining graduates were employed part-time or caring for their families in the home. The employment status of graduates provides evidence to the value of an agricultural education degree, whether that degree leads to employment opportunities or the pursuit of an advanced or professional degree.

A majority of the graduates were teaching agriculture at the secondary level and one-fourth of the graduates were employed in industry positions in the areas of sales, communications, and education. When considering only those who graduated in the teacher certification option, nine out of ten had taught at some point in their working career. Furthermore, three-fourths of these individuals indicated they were currently teaching agriculture at the secondary level. These findings exceed those of a national study that indicated only 56% of newly certified teachers entered teaching (Camp, 1998). This implies that the individuals who selected the teacher certification option pursued a career in teaching at a higher rate when compared to national averages.

In general, the employability skills needed by teachers of agriculture did not differ from those skills needed by graduates with careers in the agriculture industry. Using effective verbal communication skills was the highest rated employability skill. Ten of the fifteen employability skills were rated at or above 3.5, indicating that these skills had a major impact on the graduates' ability to successfully perform the responsibilities of their positions.

Graduates indicated that the agricultural education curriculum successfully prepared them for the employability skills needed for careers in teaching and industry. Of the ten employability skills rated as having a major impact on the ability to successfully perform the responsibilities of their job, graduates rated the agricultural education curriculum as having at least a moderate contribution to developing all ten skills.

Graduates indicated they were satisfied with the overall quality of the agricultural education program. Of the top five quality statements, graduates in teaching and industry careers both indicated they were especially satisfied with the professional competence of the agricultural education faculty. Graduates with careers in industry were most satisfied with internship opportunities provided to them while they attended the university. Graduates were also satisfied with the availability of required agricultural education courses.

Graduates with careers in teaching and industry indicated their experience with an adviser was positive. Graduates were particularly happy with the ability to interact with the faculty and the adviser's interest in them and their individual interests. Graduates were also satisfied with the availability of their adviser to answer questions.

Graduates with careers in industry indicated that they were receiving very little support upon graduation from the university. The future value of a degree from an institution of higher learning is of great importance as new students look for a place to garner advanced learning. Therefore, it is recommended that the faculty in this program find a way to increase support for

graduates with industry careers upon graduation. This support can increase the value of a degree and enhance continued graduate satisfaction in the program.

Graduates with careers in teaching and industry were both dissatisfied with the quality of computer support at the institution. Technology is an important part of the current and future situations in education. It is imperative that the institution, college, and department at this institution continue to upgrade and implement new computer technology for student use. Again, the availability of necessary technology can enhance the value of a degree and the satisfaction of graduates with a program.

The current findings give credence to the strength and versatility of the agricultural education curriculum, program and advising in preparing individuals for careers in teaching and industry. The information gained from this study should be used in developing recruitment materials and promoting the degree program options offered at the University of Missouri with potential students. The information should be shared with current students to dispel myths regarding the degree program and the opportunities available to both industry and teaching option students. Research regarding factors that influence students to select a career option should be undertaken to gain a perspective on the profile of students in each option. Furthermore, research should be expanded to investigate the factors that influence people to enter an industry or teaching profession upon graduation without regard to degree program area.

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Assessing An Agricultural Education Program's Ability to Prepare Students For Careers In Teaching And Industry

Critique

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The authors are commended for continuing to report and disseminate the findings of a programmatic research effort concerning questions relating to the retention of agricultural education teachers. The introduction section of the report provides a broad overview of some of the important issues facing many agricultural preparation programs across the United States. The authors informed the reader of the challenges agricultural education programs in universities often face when offering a broad program of study to majors with interests in teaching agricultural education or entering into agri-industry roles upon graduation.

The report addressed all major criteria of a well-written report in a commendable manner. Graphics were effectively used to present important demographic information. Well-designed tables reflected summarized data.

Further review of the report resulted in some questions that may serve to further inform the readers about the research and reporting processes along with further analysis and research opportunities related to this important topic. First of all, what theoretical framework and related literature from within and outside agricultural education were used to guide the study, objectives, instrument questions, findings, conclusions and recommendations? There are large bodies of literature relating to employability skills needed by various types of employees. Did you draw upon earlier research within and outside of the discipline to inform your choices of the selected objectives and the corresponding statements within your instrument? Why or Why not? Is the reader to conclude the selected employment skills of the study are the most common and important of all employment skills needed by a successful agricultural teacher or agricultural industry employees?

The census study was descriptive in nature. The overall purpose was to evaluate the ability of an agricultural education program to effectively prepare students for teaching and non-teaching careers in the food, fiber industries. The findings for the second and third objective were reported in the tables as means, standard deviations, and rankings. What additional analyses could you use to determine if there were any differences between the means and rankings of the teacher and non-teacher groups? What prevented you from implementing the analyses? Is there any value in knowing the results of the analyses?

The final objective sought to evaluate the agricultural education program in preparing individuals for teaching careers and careers in industry. The quality as reported on the bottom of table 3 indicate the individual responses to selected program quality statements measures were rated as poor, fair, good, and excellent. Yet, statements in the findings and conclusions and recommendations sections indicated teaching graduates "...were satisfied with the quality of the program "... and graduates with positions in industry were also satisfied with the overall quality of the agricultural education program..." If so, should the scales instead relate to the respondents level of satisfaction? How about the findings and conclusions also relating to the quality of advising?

Again, the authors are commended for selecting an important focus of inquiry! Remember that it is important that agricultural education researchers incorporate pertinent theory and research findings from other areas within the career and technical education whenever we frame our common research problems.

A Delphi Study of Agriculture Teacher Perceptions of Problems In Student Recruitment

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Introduction

Historically, agricultural education has focused on teaching the principles of production agriculture to a relatively small population of students – usually an audience of white, male, rural students who are returning to the farm. Funded as vocational agriculture, some school systems strictly adhered to the "vocational" concept, focusing on the "how" rather than the "why" of instruction. With the advance of the scientific age, this emphasis resulted in decreased agricultural enrollments and de-emphasized the scientific nature of agriculture in favor of its vocational aspect (National Research Council [NRC], 1988). In its report entitled Understanding Agriculture: New Directions for Education, the NRC recommended that the "vocational" label be avoided in order to more adequately portray the scientific and technical nature of agriculture.

Ten years after the NRC's report, the profession has been at least somewhat successful in removing the "vocational" stigma attached to secondary agriculture courses. Modernized and scientific curricula have been created and designed to be both practical and applicable, yet emphasize the scientific nature of agriculture (Dyer & Osborne, 1997). Several states embarked upon high school agriculture curriculum development and redesign efforts in the 1990s (Dormody, 1993; Johnson, 1995; Osborne & Dyer, 1996). Whether caused by changes in curricula or by other variables, there has been a corresponding increase in student enrollments as major changes in course offerings were made (United States Department of Education, 1996).

Some programs have apparently identified and solved those problems associated with recruiting and retaining students. Agricultural enrollments in several states have equaled or surpassed those of the pre-recession era of the late 1970s (Iowa Department of Education, 1997; Missouri Department of Elementary and Secondary Education, 1997; North Carolina State University, 1997). However, even with these successes agriculture programs on a national scale continue to face enrollment stagnation (National FFA Organization, 1998).

Whereas some states have been successful in building enrollments, agricultural education programs in other states continue to struggle to recruit enough students. In these states there remains the problem of recruiting and offering enough programs to adequately serve the industry of agriculture (Russell, 1993).

University teacher education programs in agriculture experience the ripple effect of high school agriculture program student recruitment problems. As many as 38 of the 50 states are unable to graduate enough agriculture teachers from university agricultural education programs to meet the

demand for new high school agriculture teachers (Camp et al., 1996). Camp (1998) estimated that high school and university agriculture programs would have to more than double enrollments to satisfy both industry's and education's growing demand for agricultural education graduates. The lack of adequate high school agriculture enrollment has translated at the post-secondary level into fewer students with agricultural training entering colleges of agriculture. Dyer, Lacey, and Osborne (1996) reported that the inability of colleges to recruit and retain students with agricultural backgrounds translates into losses of millions of dollars for institutions.

Purpose and Objective

Recruitment of quality students has been, and continues to be, one of the most important and complex problems facing both secondary and university agricultural education programs today. The purpose of this study was to identify those problems that serve as obstacles to the successful recruitment of quality students into secondary agricultural education programs. The objective of the study was to identify the major problems facing high school agriculture teachers in recruiting students for secondary agricultural education programs, as identified by agriculture teachers.

Procedures

This national study used the Delphi technique to identify problems that secondary agriculture teachers face in recruiting students in high school agriculture programs. Delp, Thesen, Motiwalla and Seshadri (1977) described the Delphi technique as a group process used to solicit, collate, and direct expert responses toward reaching consensus. Helmer (1966) described the Delphi technique as a method of substituting computed consensus for an agreed-upon majority opinion.

The population for this study consisted of secondary teachers of high school agriculture in all 50 states. Stufflebeam, McCormick, Binkerhoff, and Nelson (1985) noted the Delphi technique is especially effective in obtaining consensus among a purposively selected group of experts. In selecting the expert panel members, state staff and teacher educators from each state were asked to nominate teachers from secondary agricultural education programs in their states that were considered to be outstanding in their ability to recruit and retain students. Teacher educators and state staff provided a total of 275 unduplicated nominees. From this list a stratified random sampling technique was used to select 24 teachers to participate in the study. The four regions of the American Association for Agricultural Education comprised the strata from which six teachers each were selected. Dalkey (1969) stated that the reliability was greater than .80 when Delphi group size was larger than 13.

The study used a series of four mailed questionnaires. Moore (1987) noted that a series of mailed questionnaires was the typical methodology of the Delphi technique. The first round of the study used a questionnaire with the open-ended question: "What are the major obstacles confronting teachers in the recruitment of students in agricultural education programs?" An open-ended question was used to facilitate the generation of a wide array of response categories. Responses were then categorized by the researchers to produce items for a second round questionnaire. Questionnaires were validated using an expert panel of university teacher

educators, state agricultural education staff members, and agriculture teachers not included in the study.

In the second questionnaire, respondents were asked to rate the items identified in round one on a five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree). From second-round responses the list of categories was further reduced to 18.

The third questionnaire sought to determine consensus. Panel members were asked to indicate whether they agreed or disagreed with each of the 18 statements, and to provide comments if they could not agree with the summary findings. Consensus was reached on eight of the 18 items in this round. As noted by McCampbell and Stewart (1992), most Delphi studies reach consensus at the third round. Failing to achieve consensus on a majority of the items, a fourth round was initiated.

The fourth and final questionnaire also asked the respondents to indicate whether they agreed or disagreed with the remaining 10 statements as adapted from round three. Consensus was reached in this round so no further responses were required.

Analysis of Data

Data were analyzed using descriptive statistics. Data collected using Likert-type scales were treated as interval data and reported as means and standard deviations. Nominal data were reported using frequencies and percentages.

Results

The objective of this study sought to identify the major problems facing high school agriculture teachers in recruiting students for secondary agricultural education programs. To accomplish this objective the Delphi technique of obtaining group consensus was used. The first round of the study used a questionnaire with an open-ended question to facilitate the generation of a wide array of response categories. The response rate for this round was 75%. Thirty-five categories of problems were identified in the first round. This number was reduced to 28 items when categories with a single response were eliminated. Table 1 contains problems identified in round one. All respondents identified guidance counselor support and scheduling difficulties as problems of recruitment.

Table 1. Delphi Study Round One: Categories of Recruitment Problems. (n = 18)

Problem Category	Number of Responses
Guidance counselor support	18
Scheduling difficulties	18
Image of agriculture	17
Competition from other programs in school	16
Graduation requirements – not enough time for agriculture coursework	16
Access to potential students	14
Time to recruit	13
Students active in other programs, activities, etc.	13
Image of the agriculture program	13
School policies	12
Parental support	11
Administrative support	11
Quality of students in the program	11
Students have no interest in agriculture	10
Agriculture program quality	10
SAE participation	10
Salaries in the field of agriculture	9
Block scheduling	8
Community support	7
History of the agriculture program	6
Teacher commitment to recruiting	6
Quality of agriculture course instruction	6
Quality of agriculture curriculum	6
Poor facilities	4
Employment opportunities agriculture	4
Teacher quality	3
Type of curriculum – too traditional	3
FFA activities	3

Eighteen of the 24 individuals responded in round two for a 75% response rate. In this round respondents were asked to rate the 28 problems identified in round one on a Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree), and to make changes in the items as necessary. Results of this round of responses are displayed in Table 2.

Table 2. Delphi Study Round Two: Level of Agreement with Ranked Categories of Recruitment Problems. (n = 18)

Problem Category	M	SD	Level of Agreement*
Competition from other programs	3.94	.87	Agree
Time to recruit	3.83	1.10	Agree
Guidance counselor support	3.78	1.22	Agree
Scheduling difficulties	3.78	1.22	Agree
Students active in other programs, activities, etc.	3.61	1.04	Agree
Image of agriculture	3.61	1.09	Agree
Access to potential students	3.56	.98	Agree
Administrative support	3.50	1.15	Agree
Grad. requirements - not enough time for Ag. course	3.28	1.32	Uncertain
Parental support	3.00	1.28	Uncertain
Quality of students in the program	2.94	1.35	Uncertain
No interest in agriculture	2.94	1.39	Uncertain
School policies	2.89	1.08	Uncertain
Image of the agriculture program	2.89	1.13	Uncertain
SAE participation	2.78	1.17	Uncertain
Teacher commitment to recruiting	2.78	1.26	Uncertain
Salaries in agriculture	2.78	.88	Uncertain
Block scheduling	2.71	1.31	Uncertain
Community support	2.47	1.07	Disagree
History of the agriculture program	2.44	1.29	Disagree
Teacher quality	2.44	1.29	Disagree
Poor facilities	2.35	1.27	Disagree
Quality of the agriculture curriculum	2.33	1.37	Disagree

Table 2 (continued). Delphi Study Round Two: Level of Agreement with Ranked Categories of Recruitment Problems. (n = 18)

Problem Category	M	SD	Level of Agreement*
Employment opportunities in agriculture	2.28	1.18	Disagree
Quality of agricultural course instruction	2.28	1.36	Disagree
Type of curriculum – too traditional	2.28	1.07	Disagree
Program quality	2.17	1.38	Disagree
FFA Activities	1.56	.62	Disagree

*1.00 – 1.49 = Strongly Disagree, 1.50 – 2.49 = Disagree, 2.50 – 3.49 = Uncertain, 3.50 – 4.49 = Agree, 4.50 – 5.00 = Strongly Agree.

As noted in Table 2, respondents agreed or were uncertain on 18 items that were initially considered to be problems to recruitment. Ten were ranked "Disagree." Those 10 items were eliminated from further study as problems for recruitment.

Statements with the highest means centered around registration difficulties (competition from other programs, scheduling difficulties, access to potential students, graduation requirements), support (guidance counselor, administration, and parent), finding time to recruit, and the image of agriculture. Respondents disagreed that FFA activities, program quality, type or quality of curriculum, instructional quality, employment opportunities, facilities, teacher quality, program history, or community support were problems in recruiting students.

In round three, respondents were sent the results from round two and asked to provide a dichotomous indication of whether they agreed or disagreed that each of the 18 items were indeed problematic to recruitment. They were also asked to provide comments if they could not agree with the summary findings. Twenty-two of the 24 panel members responded in this round for a 91.7% response rate. Table 3 contains summary data for this round.

As shown in Table 3, five of the highest ranked problems associated with student recruitment were scheduling-related. More than three-fourths of the respondents agreed that scheduling difficulties, having time to recruit, students' choices to participate in other programs, access to potential students, competition from other programs, guidance counselor support, graduation requirements, image of agriculture, and no interest in agriculture were recruitment problems. By contrast, less than half of the respondents agreed that participation in SAE programs, teachers' commitment to recruiting, or school policies were problems in recruiting students.

Table 3. Delphi Round Three: Level of Agreement with Recruitment Problems Identification. (n = 18)

Problem	Agree (%)	Disagree (%)
Scheduling difficulties	86.4	13.6
Time to recruit	81.8	18.2
Students active in other programs, activities, etc.	81.8	18.2
Access to potential students	81.8	18.2
Competition from other programs	81.8	18.2
Guidance counselor support	77.3	22.7
Graduation requirements - not enough time for agriculture course	77.3	22.7
Image of agriculture	77.3	22.7
No interest in agriculture	72.7	27.3
Block scheduling	59.1	40.9
Administrative support	59.1	40.9
Image of the agriculture program	54.5	45.5
Salaries in agriculture	54.5	45.5
Parental support	50.0	50.0
Quality of students in the program	50.0	50.0
School policies	45.5	54.5
Teacher commitment to recruiting	45.5	54.5
SAE participation	41.9	59.1

Items were once again modified to reflect respondent input and mailed as statements in a fourth-round questionnaire. Seventeen of the 24 members returned questionnaires in this final round for a response rate of 70.8%. Table 4 contains the results of this round.

Table 4. Delphi Round Four: Level of Agreement with Recruitment Problems Identification. (n = 17)

Statement	Agree (%)	Disagree (%)
Difficulties in scheduling courses to meet graduation requirements and/or college admission requirements are an obstacle to enrolling students in agriculture courses.	94.1	5.9
Teachers do not have time to recruit students.	94.1	5.9
Students are so active in other school activities and programs that they are often prevented from enrolling in agriculture courses.	94.1	5.9
Agriculture teachers are not allowed access to potential students.	94.1	5.9
Other programs in school compete for the same students as does agriculture.	94.1	5.9
Lack of support from guidance counselors is a problem in enrolling students in agriculture courses.	94.1	5.9
Increased graduation requirements do not allow enough time for students to fit agriculture courses into their schedules.	94.1	5.9
The image of agriculture is an obstacle to recruiting students into agriculture courses.	82.4	17.6
The lack of interest in agriculture by many students is an obstacle to their successful recruitment into agriculture courses.	76.5	23.5
Block scheduling prevents students from being able to enroll in agriculture courses.	70.1	29.9
Lack of support from administrators is a problem in enrolling students in agriculture courses.	58.8	41.2
The image of the local agriculture program is a problem in recruiting students into agriculture courses.	58.8	41.2

Table 4 (continued). Delphi Round Four: Level of Agreement with Recruitment Problems Identification. (n = 17)

Statement	Agree (%)	Disagree (%)
The perceived salary base for graduates entering careers in the field of agriculture is a problem in recruiting students into agriculture courses.	58.8	41.2
Required participation in SAE programs is an obstacle in recruiting students into agriculture courses.	58.8	41.2
Lack of support from parents is a problem in enrolling students in agriculture courses.	52.9	47.1
The perceived quality of students in agriculture courses is an obstacle in recruiting other students into agriculture courses.	52.9	47.1
Policies and practices of local schools are obstacles to recruiting students into agriculture courses.	47.1	52.9
The lack of teacher commitment to recruitment is a problem to student recruitment for courses in agriculture.	47.1	52.9

As indicated in Table 4, scheduling difficulties, finding time to recruit, other school activities, access to students, competition from other programs, guidance counselor support, increased graduation requirements, image of agriculture, non-agriculture student interests, and problems associated with block scheduling were the problems with which at least two-thirds of the respondents agreed. A majority of respondents failed to agree that teacher commitment to recruitment and local school policies were a problem.

Conclusion

The major problems identified by the Delphi technique in the successful recruitment of students into agriculture programs were: scheduling difficulties, finding time to recruit, competition from other programs and activities, access to students, guidance counselor support, increased graduation requirements, image of agriculture, lack of interest in agriculture, and block scheduling.

Implications and Recommendations

In one form or another, seven of the top ten problems identified by the Delphi panel as being recruitment problems deal with scheduling. From having access to students to counselor support during registration to the actual placement of students in classes, those problems associated with

scheduling difficulties comprise the greatest threat to successfully recruiting students into agriculture programs. Image of agriculture and lack of interest in agriculture occupy two additional spots in the top ten problems. If we place those things that we value ahead of all else, are agricultural educators to deduce that administrators, counselors, and students do not value agriculture programs? Have agricultural educators failed to adequately convey the scientific and technological nature of agriculture to these clients? A public relations campaign targeting these stakeholders and emphasizing the scientific and technological nature of agriculture is recommended. Agriculture teachers, teacher certification faculty, state department staff, guidance counselors, and administrators should work together to develop a plan to address these issues.

Interestingly, teachers' lack of time to recruit tied for the problem with the highest percentage of respondents in agreement. However teacher commitment to recruiting efforts was not identified as one of the primary problems. This may be interpreted that teachers are willing to recruit, but lack the time to do so. However, it may also be construed that teachers do not value recruitment, and therefore do not find the time to recruit. Currently, few teacher preparation programs or teacher inservice programs focus on recruitment issues. According to Dyer and Andreasen (1997), pre-service teachers should be trained in recruitment practices just as they are trained in instructional methods. In a later study by Breja and Dyer (1999), teachers reported that they had received virtually no training in recruitment strategies and techniques. Does a relationship exist between the training received and the perceived importance of recruitment efforts? Further research is needed to answer this question.

Over half of the respondents listed participation in supervised agricultural experience (SAE) programs as being an obstacle to successful recruitment efforts. In those programs where SAE participation is an obstacle to recruitment, new alternatives to this experiential learning component are needed.

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A Delphi Study of Agriculture Teachers Perceptions of Problems in Student Recruitment

Critique

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The authors provided a quality introduction to the need to understand the barriers that prevent students from enrolling in agricultural education programs. Declining enrollments not only affect a potential source of pre-service agricultural educators, but they affect the number of potential candidates for other employment opportunities within the food, fiber, and natural resource industries. Findings from this study will, indeed, be very useful to many teachers, administrators, and policy-makers since many agricultural education programs across the United States face the challenges of declining enrollments.

While the introduction was informative and well-designed, one must question if there really is a total absence of research studies involving secondary students, or secondary students in agricultural and/or career and technical education relating to the barriers to recruiting students. If there is a body of literature, why didn't the researchers choose to report the findings concerning common barriers as part of their theoretical framework? Even though a Delphi technique was used in this study, shouldn't we use previous research findings to develop quality theoretical frameworks? If not, why not?

The procedures of the study were written in a clear, accurate and concise fashion. Details of the procedures used in this study can lead others to replication of the research process. The findings were presented in easily read tables. Considering the choice and values of the descriptors (strongly disagree through strongly agree) used in Table 2, additional frequency data would be useful in understanding the respondents views.

How do the findings and conclusions of this study support or refute the findings of other studies that address barriers to recruiting secondary students? Do we conclude that barriers facing agricultural education teachers are dissimilar to barriers faced by other teachers? Why or why not?

In the implications and recommendations section, the researchers suggest that agricultural education teachers may conclude that administrators, counselors, and students do not value agricultural education program since issues relating to scheduling were established to be the primary barriers to recruitment. In addition to a lack of training, what are other possible understandings, skills, or attitudes agricultural education teachers need to use for effectively recruiting?

This is a very important study that furnishes the profession with important findings. I encourage the researchers to continue their pursuit of answers to their proposed research questions.

The Relationship Among Leadership Perceptions of FFA Members and FFA Chapter Size, Length of FFA Membership, Level of FFA Involvement, and Officer Positions Held

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Introduction

The FFA is regarded highly for its youth leadership training. The major purpose of FFA continues to be the development of leadership, cooperation, and citizenship among our youth (Bender, Clark, & Taylor 1979). Many of the objectives of FFA fit into the business and industry paradigm of leadership. Melendez (1996, p. 293) defined leaders as "people of vision, effective communicators, effective decision makers and intelligent individuals. They respect and value individuals and their dignity; they are committed to service and to obedience to the unenforceable; they have total honesty and integrity; they are kind and they often see themselves as teachers." These characteristics match closely with those that the FFA leadership training programs advocate.

Theoretical Framework

Much of the research concerning the FFA focuses on small groups and local levels (Townsend and Carter, 1983; Ricketts and Newcomb, 1984; Stewart, Smith, Ehlert, and Milhalevich, 1985; Scanlon and Burkett, 1986; Fraze, 1986; Marshall, 1990; Dormody and Seevers, 1994; Wingenbach and Kahler, 1997). These studies have confirmed that leadership can be taught, and the FFA is successful in its purpose. Researchers have found that students who have been members of FFA possess more leadership and personal development abilities than do nonmembers (Stewart et al., 1985). This perception of leadership skills also was enhanced through participation in state and national activities (Townsend and Carter, 1983). Those authors found that leadership traits of youth could be enhanced by participation in FFA activities. This research also showed that members were more active on a local basis and in activities that offered individual levels of participation. Yet the members who had attended the state and national conferences had a higher perception of their leadership skills. Dormody and Seevers (1994) continued the exploration into leadership life skills development of FFA members and

found that such development was influenced by three factors: achievement expectancy, participation in FFA activities, and gender.

Because of FFA's national orientation, an investigation of member demographics in relationship to members' perceptions of their leadership skills could provide a contemporary picture of FFA members' leadership status. Knowing that leadership education is effective aids in program planning as well as objective evaluation activities. Additionally, the leadership paradigm used by business and industry focuses heavily on teamwork and communication skills and, if the FFA is to remain a front-runner in youth leadership training, it is necessary to know whether FFA members perceive that they possess these skills.

Purpose and Objectives

This study was created as a part of a larger study to develop an FFA Member Leadership Model. For this inquiry, the research components included size of FFA chapter, length of FFA membership, level of FFA involvement and FFA officer positions held. The specific objectives for this study were to determine:

1. Selected demographic characteristics of participants in the FFA Washington Leadership Conference who represent FFA state officers and members.
2. The demographic characteristics that create strong self-perceptions of an FFA member's ability to lead, make decisions, work in groups, understand self, and communicate.

Hypotheses

Based on the purpose and objectives of this study, four null research hypotheses were formulated. All references to self-perceived leadership skills includes five scales: leadership, making decisions, communicating, understanding self, and working with groups.

H_1= There is no relationship between FFA chapter size and FFA members' self-perceived leadership skills.
H_2= There is no relationship between length of FFA membership and FFA members' self-perceived leadership skills.
H_3= There is no relationship between level of FFA involvement and FFA members' self-perceived leadership skills.
H_4= There is no difference in self-perceived leadership skills among local and district officers, state officers, and members that do not hold officer positions.

Procedures

A correlation design was used for this study. The dependent variables were five self-perceived leadership skills: communication, decision making, understanding self, and working with groups and leadership. The independent variables were: chapter size, years of participation, number of activities, and officer positions held. A confidence interval of alpha .10 was set *a priori*.

Population and Sample

The target population for this study consisted of leaders in the FFA located throughout the United States. The accessible population consisted of 2,086 FFA members who attended one of three sessions of the Washington Leadership Conference held for 7 weeks during the summer of 1997. They represented 44 states, excluding Alaska, Delaware, Hawaii, Massachusetts, New Hampshire, and Rhode Island. The respondents represent a convenience sample of 291 FFA members who chose to complete the questionnaire. Twelve of the questionnaires were unusable due to improper procedure in the completion; therefore, the usable sample was 277 respondents.

Instrumentation

The instrument used to assess the students' self-perception of leadership skills was the Leadership Skills Inventory (LSI), developed at Iowa State University in 1980 by R. I. Carter. The original instrument consisted of 99 statements with 10 internal scales. These were aligned with the FFA's aims and purposes. Reliability coefficients on these scales ranged from .41 to.79. Through further refinements (Townsend and Carter, 1983), the LSI now consists of 21 statements describing various leadership and life skills. These statements correspond to five internal scales for analysis: working with groups, understanding self, making decisions,

Table 1. Internal Scales for Leadership Skills Inventory.

Scale	Item #	Statement
Working with Groups	1.	I can cooperate and work in a group.
	2.	I get along with people around me.
	4.	I believe in dividing the work among group members.
	8.	I listen carefully to opinions of group members.
	12.	I believe that group members are responsible persons.
Understanding Self	3.	I feel responsible for my actions.
	5.	I understand myself.
	13.	I am sure of my abilities.
	17.	I accept who I am.
	18.	I feel responsible for my decisions.
Communicating	10.	I can lead a discussion.
	14.	I am a good listener.
	19.	I can give clear directions.
	20.	I can follow directions.
Making Decisions	7.	I consider all choices before making a decision.
	11.	I use past experiences in making decisions.
	15.	I use information in making decisions.
Leadership	6.	I feel comfortable teaching others.
	9.	I am respected by others my age.
	10.	I can lead a discussion.
	16.	I feel comfortable being a group leader.
	19.	I can give clear directions.
	21.	I can run a meeting.

communicating, and leadership. The statements used on the survey instrument to measure subjects' skills in these areas are shown in Table 1. The reliability coefficients for the current study were communicating .74, working with groups .69, making decisions .69, understanding self .78 and leadership .84.

Responses were based on a five point Likert-type scale of: 5-strongly agree, 4-agree, 3-undecided, 2- disagree, and 1- strongly disagree. A higher numeric value for a particular statement indicated a stronger agreement or self-perception of the skill.

Data Collection

Data were gathered prior to the conference to avoid confounding effects. In an effort to ensure anonymity of the subjects, the researcher was not present during data collection. The conference coordinators agreed to carry out the necessary steps for gathering the data.

In late May 1997, packets of questionnaires were mailed to the Washington Leadership Conference coordinators. Each packet contained 150 questionnaires and 150 scantrons to be distributed to the conference participants. A complete set of instructions for distribution was included. Registration coordinators were asked to request that conference participants complete a questionnaire to the best of their ability and return the completed scantron prior to the beginning of the conference.

The questionnaire contained brief instructions for completing the scantron and information assuring the protection of the subject's anonymity. Registration coordinators returned the completed scantrons to Texas A&M University. The questionnaire included demographic questions and the LSI. The scantron was scored by Texas A&M University Measurement and Evaluation, and the information was entered into the computer by the researcher for analysis. Data were analyzed using the personal computer version of SPSS^{R}.

Results

The subjects' age representation was as follows: 38 subjects were 15 years old or younger, 99 were 16 years old, 132 respondents were 17 and 10 respondents were 18 years old. Females represented 56.6% of the respondents, 43.4% were male.

FFA Chapter Size and Leadership Self-Perceptions

Correlations were made between all five LSI measurement scales and 11 categories of chapter size. These categories were 1-15 members, 16-30 members, 31-45 members, 46-60 members, 61-75 members, 76-90 members, 91-105 members, 106-120 members, 121-135 members, 136-150 members, and 151 or more members. The findings are shown in Table 2.

Statistically significant relationships occurred between FFA chapter size and the LSI scales of communication (r=. 116), working with groups (r=. 135), decision making (r=. 220) and leadership (r=. 107), but not the understanding self scale. As chapter size increased, so did the strength of an FFA member's perception in his or her ability to communicate, work with groups, make decisions, and lead a group.

Table 2. Pearson's Product Moment Correlation between FFA Chapter Size[1] and LSI Score[2].

LSI Scale[3]	N[2]	Mean Score	r	p
Communication			0.116	0.053*
1-15	2	4.125		
16-30	28	4.036		
31-45	33	4.205		
46-60	43	4.349		
61-75	29	4.121		
76-90	30	4.250		
91-105	28	4.339		
106-120	17	4.471		
121-135	12	4.417		
136-150	21	4.202		
151 or more	34	4.364		
Working with Groups			0.135	0.025*
1-15	2	4.300		
16-30	28	4.357		
31-45	33	4.521		
46-60	43	4.516		
61-75	29	4.386		
76-90	30	4.531		
91-105	28	4.543		
106-120	17	4.682		
121-135	12	4.617		
136-150	21	4.505		
151 or more	34	4.594		
Decision Making			0.220	0.000*
1-15	2	4.333		
16-30	28	4.036		
31-45	33	4.250		
46-60	43	4.238		
61-75	29	4.081		
76-90	30	4.222		
91-105	28	4.381		
106-120	17	4.628		
121-135	12	4.472		
136-150	21	4.300		
151 or more	34	4.490		
Leadership			0.107	0.081*
1-15	2	4.250		
16-30	28	3.887		
31-45	33	4.111		
46-60	43	4.191		
61-75	29	3.893		
76-90	30	4.238		
91-105	28	4.309		
106-120	17	4.294		
121-135	12	4.273		
136-150	21	4.108		
151 or more	34	4.204		

Understanding Self			0.044	0.468
1-15	2	4.400		
16-30	28	4.336		
31-45	33	4.550		
46-60	43	4.535		
61-75	29	4.359		
76-90	30	4.347		
91-105	28	4.479		
106-120	17	4.729		
121-135	12	4.533		
136-150	21	4.410		
151 or more	34	4.500		

Note: [1]FFA Chapter Size: 1= 1-15, 2=16-30, 3=31-45, 4=46-60, 5=61-75, 6=76-90, 7=91-105, 8=106-120, 9=121-135, 10=136-150, 11=151 or more
*p<0.10 [2]Adjusted for missing cases
[3]LSI Scale: 1=strongly disagree, 2=disagree, 3= undecided, 4=agree, 5=strongly agree

Length of FFA Membership and Leadership Self-Perceptions

Correlations were made between the five LSI measurement scales and seven categories of length of FFA membership. The possible category responses were 1 year or less, 2 years, 3 years, 4 years, 5 years, 6 years, or 7 years.

No statistically significant relationships were found in any of the correlations between the five LSI measurement scales and length of FFA membership. This result indicated that FFA members' self-perceived abilities to communicate, work with groups, make decisions, lead, or understand self are not related to their length of FFA membership. A summary of the results is found in Table 3.

Table 3. Pearson's Product Moment Correlation between Length of Membership[1] in the FFA and LSI Score [2].

LSI Scale[3]	N[2]	Mean Score	r	p
Communication			0.057	0.342
1 year or less	40	4.275		
2 years	62	4.182		
3 years	104	4.209		
4 years	53	4.476		
5 years	12	4.417		
6 years	5	3.700		
Working with Groups			0.019	0.755
1 year or less	40	4.532		
2 years	62	4.468		
3 years	104	4.499		
4 years	53	4.608		
5 years	12	4.450		
6 years	5	4.360		

Decision Making			-0.057	0.344
1 year or less	40	4.333		
2 years	62	4.290		
3 years	104	4.260		
4 years	53	4.271		
5 years	12	4.194		
6 years	5	3.733		
Leadership			0.078	0.205
1 year or less	40	4.107		
2 years	62	4.048		
3 years	104	4.100		
4 years	53	4.359		
5 years	12	4.409		
6 years	5	3.467		
Understanding Self			- 0.010	0.866
1 year or less	40	4.468		
2 years	62	4.452		
3 years	104	4.458		
4 years	53	4.550		
5 years	12	4.550		
6 years	5	3.880		

Note: [1]Length of Membership in the FFA: 1=One year or less, 2=Two years, 3=Three Years, 4=Four Years, 5=Five Years, 6=Six Years, 7=Seven or more years
*p<0.10 [2]Adjusted for missing cases
[3]LSI Scale: 1=strongly disagree, 2=disagree, 3= undecided, 4=agree, 5=strongly agree

Level of FFA Involvement and Leadership Self-Perceptions

Correlations were made between all five LSI measurement scales and three categories of FFA involvement. The three categories included: FFA leadership camps, FFA leadership workshops/conferences, and FFA leadership activities such as contests or demonstrations. Possible responses ranged from no participation in the category; participating in one camp, conference, or activity; and participating in up to 10 or more camps, conferences, or activities.

Statistically significant relationships were found for all five of the LSI measurement scales (Table 4). The more involved FFA members are, the stronger they perceive their leadership abilities to be.

Table 4. Pearson's Product Moment Correlation between Level of Involvement[1] in the FFA and LSI Score[2].

LSI Scale[3]	N[2]	Mean Score	r	p
Communication			0.217	0.000*
1 or none	14	3.911		
2	39	4.192		
3	45	4.089		
4	43	4.192		
5	53	4.302		
6	32	4.453		
7	19	4.592		
8	24	4.490		
9	5	4.650		
10 or more	2	2.750		
Working with Groups			0.126	0.037*
1 or none	14	4.300		
2	39	4.431		
3	45	4.476		
4	43	4.530		
5	53	4.578		
6	32	4.548		
7	19	4.600		
8	24	4.592		
9	5	4.560		
10 or more	2	3.900		
Decision Making			0.141	0.020*
1 or none	14	3.949		
2	39	4.171		
3	45	4.235		
4	43	4.341		
5	53	4.321		
6	32	4.385		
7	19	4.456		
8	24	4.306		
9	5	4.533		
10 or more	2	3.667		
Leadership			0.290	0.000*
1 or none	14	3.583		
2	39	3.970		
3	45	3.968		
4	43	4.027		
5	53	4.270		
6	32	4.425		
7	19	4.518		
8	24	4.341		
9	5	4.542		
10 or more	2	3.250		

Understanding Self			0.148	0.015*
1 or none	14	4.143		
2	39	4.390		
3	45	4.427		
4	43	4.470		
5	53	4.526		
6	32	4.481		
7	19	4.653		
8	24	4.633		
9	5	4.520		
10 or more	2	3.600		

Note: [1]Level of Involvement: Cumulative scale combining responses about FFA leadership workshops/conferences; FFA leadership camps, and FFA leadership activities (contests, demonstrations).
*p<0.10 [2]Adjusted for missing cases
[3]LSI Scale: 1=strongly disagree, 2=disagree, 3= undecided, 4=agree, 5=strongly agree

Officer Positions Held and Leadership Self-Perceptions

Mean scores of all five LSI measurement scales were compared for FFA members who had held committee chair positions or no officer position versus FFA members who had held local, district, state, or national officer positions. The latter group had significantly higher scores for the LSI measurement scales of communication and leadership. Differences between groups were not statistically significant for the LSI measurement scales of working with groups, making decisions, and understanding self. These results are illustrated in Table 5.

Table 5. T-test for Independent Samples: Highest FFA Officer Position Held[1] and LSI Score[2].

LSI Scale[3]	Number Reponses Total = 277	Mean score	SD	2-Tail Prob.
Communication				
Committee Chair or No position	62	4.149	0.593	0.084*
Local-National Office	214	4.297	0.590	
Working with Groups				
Committee Chair or No position	63	4.505	0.387	0.858
Local-National Office	213	4.516	0.425	
Decision Making				
Committee Chair or No position	61	4.251	0.540	0.582
Local-National Office	213	4.296	0.560	
Leadership				
Committee Chair or No position	60	3.969	0.713	0.021*
Local-National Office	207	4.190	0.628	
Understanding Self				
Committee Chair or No position	63	4.441	0.504	0.606
Local-National Office	213	4.477	0.476	

Note: [1]Highest FFA Officer Position Held: 1=Committee Chair or No position, 2=Local-National Office
*p<0.10 [2]Adjusted for missing cases
[3]LSI Scale: 1=strongly disagree, 2=disagree, 3= undecided, 4=agree, 5=strongly agree

Conclusions, Recommendations, and Implications

The FFA instills in its members the belief that everyone can and should be a leader. However, no one has the skill or expertise to always lead; therefore, this position must be transferable within the group. Researchers have found that students who have been members of the FFA possess more leadership and personal development abilities than nonmembers do (Stewart et al., 1985). This study supports the positive impact of FFA on members' self-perceptions of leadership.

Chapter size was an important factor in determining these FFA members' self-perceptions of their leadership skills. These results could be due to the fact that larger FFA chapters may provide students with more occasions to practice their leadership skill areas, thereby strengthening their self-perceptions. The literature surrounding leadership research does not address chapter size as a factor in leadership training or perceptions.

Length of FFA membership was not a contributing factor of these FFA members' self-perceived leadership skills. However, level of FFA involvement was a major contributor. The effects of practice on these skills could explain this result. FFA members who have engaged in high levels of FFA involvement have had more opportunities to practice their skills in communication, working with groups, making decisions, leadership, and understanding themselves. This practice, in turn, has developed their confidence and self-perception of their abilities to perform these skills.

This reinforces the findings of previous studies. In 1983, Townsend and Carter found that leadership traits of youth are enhanced by participation in FFA activities. Dormody and Seevers (1994) and Wingenbach and Kahler (1997) reported that leadership life skills development was influenced by participation in FFA activities. The results of this study most closely align with the results of Ricketts and Newcomb (1984). They found that there was a direct correlation between the leadership abilities of FFA members and the level of activity by an individual within the chapter.

Holding an officer position had a significant influence on the LSI scales of communication and leadership. This may be due to an increased opportunity for FFA members holding an officer position to practice their communication and leadership skills. This would be a likely scenario, because officers often have access to additional leadership training that other members do not. Officers also are expected to perform different functions than other members including running meetings, speaking at functions, and assisting in training new members and officers.

Programmatic Implications

This study found that FFA members from larger FFA chapters had stronger self-perceptions of their abilities to communicate, work in groups, make decisions, and lead. Therefore, small chapters are recommended to create some situations that simulate large chapter settings. Also opportunities for all FFA members to hold at least a local chapter officer position should be encouraged. This is especially important in rural areas. For leadership development involvement in FFA activities is a necessity. Length of membership is not as important in the

development of leadership skills as involvement in activities. The opportunity to experience and practice those skills is the important factor.

Recommendations for Additional Research

Additional research also is recommended relating to group size and leadership self-perception and more closely examining the relationship between FFA chapter size and leadership skills of FFA members. Further research should be conducted into the role of the FFA in helping students to understand themselves. The LSI scale, understanding self, consistently was the same for all FFA members. It should be determined if membership in the FFA creates a difference in the self-perceived ability to understand one's self between FFA members and other students. This study should be replicated with other national youth organizations, such as VICA, DECA, the Boy Scouts of America, and 4-H, that utilize leadership education to gain a larger picture of youth leadership training. Students who do not participate in youth organizations also should be studied using similar methods to develop an understanding of the differences between members of youth organizations and other students.

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The Relationship Among Leadership Perceptions of FFA Members And FFA Chapter Size, Length of FFA Membership, Level of FFA Involvement, and Officer Positions Held

A Critique

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The topics of leadership and FFA are important to the agricultural education profession and the authors are to be commended for furthering our understanding of how certain variables might be associated with FFA members' self-perceived leadership skills. The objectives and hypotheses for the study were clearly stated and the procedures used in conducting the study were described in detail.

My most serious reservations have to do with the analysis and interpretation of results. The paper was written as if the authors were trying to establish a causal relationship between the demographic characteristics and the FFA members' self-perceived leadership skills. Their second objective was to determine the demographic characteristics that **create** strong self-perceptions.... In addition, the authors identify independent and dependent variables, note that the questionnaire was given before the Washington Leadership Conference to avoid confounding effects, and the conclusions and recommendations were written as if the study had demonstrated a causal link between some of the independent variables and FFA members' self-perceived leadership skills.

In order to establish a casual relationship, the independent and dependent variables must be correlated, the independent variable must always precede the dependent variable in time, and other factors that might be possible causes of the relationship between the independent and dependent variable must be ruled out. Were any of the independent variables in this study correlated with the dependent variables? The authors reported statistically significant relationships between FFA chapter size and the LSI scales of communication, working with groups, decision-making, and leadership, for example. Using Davis's (1971) descriptors, these associations ranged in magnitude from negligible to low. Furthermore, the largest of these associations would yield an r^2 value of .048. In other words, less than 5 percent of the variance in decision-making was explained by FFA chapter size. I would not consider this to be of practical significance. Could we all agree that the demographic characteristics included in the study always precede the students' perception of their leadership skills? The authors concluded that FFA involvement is a major contributor to self-perceived leadership skills. Might it be just as plausible that the level of participation in FFA is influenced by students' self-perceived leadership skills? Finally, the authors took no steps to rule out other factors that might be causing the relationships that they observed. A strong theoretical framework should be the basis for determining what relationships to examine.

In summary, the conclusions regarding chapter size, length of FFA membership and level of FFA involvement are not supported by the data. Based on the data analysis and the fact that respondents comprise a 10% convenience sample of the accessible population of Washington Leadership Conference participants in the summer of 1997, I would be very cautious in acting upon the programmatic implications detailed by the authors.

A Longitudinal Study of the Impact of Block Scheduling on Agricultural Education Programs

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Introduction and Theoretical Framework

Block scheduling has been a primary component of educational reform for much of the past decade. The goal of block scheduling is to increase course offerings, reduce the number of teacher preparations, decrease class sizes, and master more information within similar financial parameters (Carroll, 1989). School administrators will continue to utilize block scheduling as an effective scheduling system as long as high school graduation requirements continue to escalate. Consequently, agricultural educators must continue to adjust programs to adapt to an ever-changing educational environment. The concept of block scheduling requires advanced technical training for teachers to meet the new demands in classroom instruction (Carroll, 1989). Research efforts must continue to evaluate the positive and negative effects of this alternative use of school time. The purpose of this study is to observe the longitudinal changes among agricultural teachers on the impact of block scheduling.

Most studies conducted in the field of Agricultural Education take a snapshot approach to research. Analysis is conducted at a specific time and place. "The longitudinal study provides a somewhat different perspective" (Meyers & Grossen, 1978, p. 204). Meyers and Grossen (1978) found the primary advantage of using a longitudinal study is that it allows an opportunity to observe a specific situation over a prolonged period of time. It also allows the same subjects to be observed over a period of time providing considerable control on subject variables. Several longitudinal studies have been conducted in Agricultural Education (Gamon & Scofield, 1998; Radhakrishna & Xu, 1996; Taylor & Johnson, 1993; Johnson, 1993; Bowen & Radhakrishna, 1991), but more studies are needed. Topics have varied from perceptions of sustainable agriculture to achievement in the agricultural mechanics Career Development Event (CDE).

The most recent studies conducted on block scheduling in the agricultural education field evaluate perceptual differences among different populations. Kirby, Moore, and Becton (1996) concluded teachers responded to block scheduling in a favorable manner. They also found laboratory activities could be conducted more effectively, increased enrollment in agricultural courses, and that teachers had more time to prepare for classes. Teachers also responded that discipline problems have not declined, it is not easier to cover core competencies, and that attendance at FFA meetings had not increased since the introduction of block scheduling. Wortman, Moore, and Flowers (1997) found students reacted positively to block scheduling. Students liked block scheduling because it was easier to enroll in agricultural courses, allowed time to complete assignments, and teachers utilized new teaching methods. Students also agreed that block scheduling had greater positive effects on instruction than on FFA or SAE activities.

Baker, Bowman, & Winstead (1999) found significant differences between teachers with 1-10 years of experience and teachers with 21 or more years of experience on items such as "better rapport with students", "improvement in student work", "better able to meet student needs", and "FFA positively viewed as a co-curricular component." Each study indicated positive impacts on classroom instruction, but established concerns for FFA and SAE activities.

Purpose and Objectives

The primary purpose of this study was to evaluate agriculture teacher attitudes toward block scheduling, and to describe the differences in attitudes toward block scheduling of teachers with varying levels of teaching experience over a two-year period. Specific objectives of this research effort included:

1. Present the 1996 statistical differences among teachers' perceptions toward the effects of block scheduling on agricultural education programs.

2. Present the 1998 statistical differences among teachers' perceptions toward the effects of block scheduling on agricultural education programs.

3. Determine if perceptual differences over time exist within groups of teachers with varying levels of teaching experience regarding the effects of block scheduling on agricultural education programs.

Methods and Procedures

Development of the Instrument

The instrument used to generate the data was assembled from surveys previously compiled to examine the efficacy of block scheduling. A panel of experts consisting of teacher educators as well as state staff members tested content validity. A group of secondary agricultural instructors were selected to field test the instrument yielding a Cronbach's alpha of a .89.

The survey contained thirty questions and five identifiable sections. The first section contained questions regarding institutional data, as well as queries regarding whether the school was currently using or planning to use block scheduling, degree of instructor input into scheduling changes, years of instructor employment and community size. Responses to questions in the next three sections were recorded on a 5 point Likert-type scale where a response of 1 indicated strong agreement with the statement and 5 strong disagreement. The second section contained questions related to changes associated with classroom instruction. The third section examined the changes associated with the overall agricultural education program, while the fourth examined block scheduling affect on the school's FFA program. The final section was composed of three open-ended questions that encouraged teachers to provide additional information regarding block scheduling and to embellish the answers they provided in the four previous sections of the survey.

Data Collection

Nineteen ninety-six data were collected with a mailed survey to secondary agriculture instructors in a Midwestern state. Of the 248 surveys initially distributed, 140 responses were received for an effective response rate of 56 percent. A follow-up mailing to non-respondents gathered additional returns, while a telephone survey was conducted of instructors that had not previously responded. Completed surveys were received from agriculture teachers from all 140 high schools that offer agriculture education courses. The final response rate was 71.3 percent (177 completed surveys). Surveys by early and late respondents were compared using procedures suggested by Miller and Smith (1983). Significant differences between group responses were not found. It is important to note that a majority of the secondary agricultural education programs in this state contain more than one teacher.

Once the data were retrieved, 92 of the 177 respondents indicated that their school district had indeed implemented block scheduling. Block scheduling respondents were then separated into groups based upon levels of teaching experience. The outcome generated a group size of 33 teachers with 1 to 10 years of experience, a group size of 29 teachers with 11 to 20 years of experience, and a group size of 30 for teachers with 21 or more years of experience. These groups were established to analyze perceptual differences among variables.

Nineteen ninety-eight data waer collected at the state vocational agricultural teachers conference. Approximately 88% of the agricultural teachers attend the annual conference. The instrument was completed during one session of the conference. Ninety-nine surveys were collected out of a possible 200 attendees. A follow-up study could not be conducted due to institutional rules governing research with human subjects and limited control, which are limitations to this study. The institution requires a proposal to be submitted to the Research Board. The Research Board requested that respondents remain anonymous. Even with this request granted, the response rate was still approximately 50%. Seventy-five respondents indicated they were currently using block scheduling. These respondents were then separated into the same 1996 groups.

Data Analysis

Both 1996 and 1998 data were analyzed using the PC version of the Statistical Analysis System (SAS). Descriptive statistics (mean, variance, standard deviation) were derived initially. Each data set was analyzed separately by using analysis of variance (ANOVA) to test whether statistically significant differences existed among the responses of agriculture teachers with varying levels of teaching experience. This procedure was followed by using Scheffe's post hoc test to determine which groups were statistically different from each other. Descriptive statistics from each data set were then used to conduct t-tests on each variable to determine whether significant differences existed within groups over the two year period.

Results and Findings

Objective 1: Results of 1996 Data Set.

Table 1 shows the descriptive statistics as well as the ANOVA and Scheffe procedures on the 1996 data set. These procedures were used to test the perceptual differences existing among teacher groups.

The ANOVA procedure indicated significant differences at the .05 alpha level on the following variables in the 1996 data set: "I know my students better", "I have seen improvement in the quality of student work", "I am better able to meet student needs", and "FFA is viewed more positively as a co-curricular component of the agriculture

Table 1. 1996 Teacher Perceptions Toward Block Scheduling on Agricultural Education.

As a result of block scheduling, I	*Group I* (n=33) Mean (SD)	*Group II* (n=29) Mean (SD)	*Group III* (n=30) Mean (SD)	F-value df(2,88)
1. Feel more involved in curriculum.	2.45 (1.00)	2.54 (1.10)	2.80 (1.27)	0.80
2. Know students better.	2.36[a] (1.14)	2.93[ab] (1.25)	3.27[b] (1.31)	4.38*
3. Have seen improvements in students work.	2.36[a] (0.90)	2.55[ab] (1.15)	3.10[b] (1.32)	3.55*
4. Am better able to meet student needs.	2.24[a] (0.90)	2.45[ab] (1.02)	2.90[b] (1.27)	3.14*
5. Have more planning time.	1.81 (1.01)	2.24 (1.30)	2.20 (1.45)	1.09
6. Use a larger variety of teaching methods.	1.81 (0.68)	1.79 (0.77)	1.77 (0.90)	0.03
7. Believe students learn more material.	3.24 (1.32)	2.93 (1.22)	3.57 (1.33)	1.74
8. Believe transfer students more easily adjust.	3.27 (0.72)	3.32 (0.61)	3.27 (1.14)	0.05
9. Believe students have more time for portfolios.	2.24 (0.61)	2.36 (0.91)	2.38 (0.98)	0.26
10. Believe less time is wasted.	2.33 (0.96)	2.34 (1.04)	2.13 (1.01)	0.55
11. Easier to complete a lesson.	1.79 (0.65)	2.07 (0.92)	2.07 (1.10)	1.02
12. Am able to use multiple presentations.	1.61 (0.61)	1.69 (0.66)	1.80 (0.81)	0.62
13. Overall enrollment has increased.	1.76 (0.94)	1.66 (0.97)	2.07 (1.28)	1.08
14. Quality of students has increased.	2.70 (1.21)	2.48 (1.27)	2.70 (1.39)	0.15

15. School views agriculture program more positively.	2.61 (1.09)	2.52 (0.95)	2.76 (1.06)	0.58
16. More integration is allowed.	1.91 (0.77)	1.97 (0.87)	2.17 (0.95)	0.72
17. I can offer more courses in a year.	2.15 (1.20)	2.17 (1.10)	1.93 (0.87)	0.56
18. Easier to coordinate co-op programs.	2.57 (0.86)	2.78 (0.89)	2.72 (1.03)	0.40
19. More opportunities for electives.	1.72 (1.11)	1.83 (0.93)	1.83 (0.99)	0.16
20. Have found that FFA membership has increased.	2.75 (1.30)	2.72 (1.36)	3.17 (1.32)	0.56
21. Have found there are more females in FFA.	2.33 (0.74)	2.48 (0.99)	2.67 (1.03)	1.03
22. Have found there are more minorities. in FFA.	3.12 (0.65)	3.10 (0.77)	3.14 (0.79)	0.01
23. Believe FFA is viewed more positively as a component of the program.	2.51^{a} (1.00)	3.07^{ab} (0.92)	3.60^{b} (0.93)	10.72*
24. Believe it is easier to prepare for CDE's.	3.42 (1.20)	3.83 (0.85)	3.76 (1.06)	1.27
25. Have found more time for record keeping.	3.15 (1.30)	3.24 (0.95)	3.57 (1.10)	1.29
26. Have noticed greater participation among FFA members.	3.06 (1.09)	3.34 (1.11)	3.63 (0.93)	2.37
27. Do not have FFA members in class each semester.	2.00 (1.46)	2.18 (1.28)	1.89 (1.07)	0.47
28. Believe FFA has been adversely effected.	2.48 (1.15)	2.17 (1.17)	2.13 (1.11)	0.83
29. Believe flex time has helped FFA.	2.83 (1.26)	3.19 (1.02)	3.38 (0.90)	1.89
30. Students are more easily informed about FFA activities.	3.96 (0.98)	3.79 (0.95)	4.03 (1.13)	0.47

Experience: Group I: 1-10 years, Group II: 11-20 years, Group III: 21 or more years.
Response Scale: 1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly Disagree
*Note: Scheffe procedure identified means that were significantly different at the .05 level with a different letter superscript among groups. Means with the same superscript indicates no significant differences were found among groups sharing a given superscript.

program." The Scheffe post hoc procedure indicated teachers in Group I tended to agree that block scheduling helped them to get to know the students better, while the teachers in Group III possessed an impartial perception (near to the median possible response, 3) to the item. The Scheffe post hoc procedure also found teachers in Group I tended to agree that block scheduling aided in the improvement of students work, but the teachers in Group III shared a more obverse viewpoint. The above procedure also showed teachers in Group I tended to agree that block scheduling helped them to better meet the needs of the students, while teachers in Group III again tended to be more impartial. The Scheffe post hoc procedure indicated teachers in Group I tended to agree that FFA was viewed more positively as a co-curricular component of the agriculture program. However, teachers in Group III tended to disagree.

Objective 2: Results of 1998 Data Set.

Table 2 outlines the descriptive statistics as well as the ANOVA and Scheffe procedures on the 1998 data set. These procedures were used to test the perceptual differences among teacher groups.

Table 2. 1998 Teacher Perceptions Toward Block Scheduling on Agricultural Education.

As a result of block scheduling, I	*Group I* (n=33) Mean (SD)	*Group II* (n=16) Mean (SD)	*Group III* (n=26) Mean (SD)	F-value df(2,72)
1. Feel more involved in curriculum.	2.72[ab] (1.04)	2.25[a] (0.77)	3.26[b] (0.87)	6.16*
2. Know students better.	3.30 (1.19)	3.00 (1.03)	3.38 (1.17)	0.58
3. Have seen improvements in students work.	3.03 (1.14)	2.50 (0.97)	3.31 (1.16)	2.60
4. Am better able to meet student needs.	2.78 (1.10)	2.50 (1.03)	3.08 (1.02)	1.52
5. Have more planning time.	1.94 (1.09)	1.44 (0.51)	1.88 (1.03)	1.53
6. Use a larger variety of teaching methods.	2.03 (0.85)	1.63 (0.50)	2.00 (0.94)	1.44
7. Believe students learn more material.	3.36 (1.19)	2.69 (1.14)	3.60 (1.35)	2.73
8. Believe transfer students more easily adjust.	3.41 (0.71)	3.25 (0.68)	3.54 (1.14)	0.54
9. Believe students have more time for portfolios.	2.66 (1.07)	2.13 (0.62)	2.81 (0.98)	2.64
10. Believe less time is wasted.	2.52 (1.18)	2.06 (1.06)	2.62 (1.10)	1.28
11. Easier to complete a lesson.	2.16 (1.08)	1.93 (0.99)	2.26 (1.00)	0.51
12. Am able to use multiple presentations.	1.88 (0.79)	1.63 (0.62)	1.96 (0.54)	1.23
13. Overall enrollment has increased.	2.66[a] (1.38)	1.44[b] (0.63)	2.04[ab] (1.00)	6.54*
14. Quality of students has increased.	2.78 (1.10)	2.25 (1.06)	2.92 (1.32)	1.71
15. School views agriculture program more positively.	3.00[a] (0.92)	2.31[b] (0.79)	2.92[ab] (0.89)	3.49*
16. More integration is allowed.	2.22 (0.83)	2.00 (0.73)	2.35 (0.89)	0.85
17. I can offer more courses in a year.	2.28	1.88	1.88	1.70

	(1.05)	(0.96)	(0.71)	
18. Easier to coordinate co-op programs.	2.47	2.75	2.48	0.47
	(0.98)	(0.93)	(1.08)	
19. More opportunities for electives.	2.47^{a}	1.63^{b}	1.92^{ab}	3.40*
	(1.32)	(0.50)	(1.16)	
20. Have found that FFA membership	3.06	2.69	3.23	1.05
has increased.	(1.13)	(1.35)	(1.14)	
21. Have found there are more females	2.43	2.13	2.38	0.72
in FFA.	(1.01)	(0.81)	(0.70)	
22. Have found there are more minorities.	3.28	2.94	3.11	0.96
in FFA.	(0.81)	(0.85)	(0.82)	
23. Believe FFA is viewed more positively	2.84^{ab}	2.50^{a}	3.46^{b}	4.98*
as a component of the program.	(1.04)	(0.89)	(1.07)	
24. Believe it is easier to prepare for CDE's.	3.19^{a}	3.50^{ab}	4.12^{b}	5.31*
	(1.28)	(1.03)	(0.82)	
25. Have found more time for record	3.13^{a}	3.13^{a}	3.92^{b}	4.38*
keeping.	(1.18)	(1.20)	(0.93)	
26. Have noticed greater participation	3.25	3.13	3.69	1.89
among FFA members.	(1.08)	(0.89)	(1.09)	
27. Do not have FFA members in class	2.06	2.13	2.00	0.04
each semester.	(1.46)	(1.36)	(1.17)	
28. Believe FFA has been adversely	2.59	2.38	2.19	0.95
effected.	(1.29)	(0.81)	(1.02)	
29. Believe flex time has helped FFA.	3.27	3.33	3.81	2.27
	(1.11)	(0.90)	(0.90)	
30. Students are more easily informed	3.94	4.00	4.42	1.73
about FFA activities.	(1.22)	(1.13)	(0.64)	

Experience: Group I: 1-10 years, Group II: 11-20 years, Group III: 21 or more years.
Response Scale: 1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly Disagree
*Note: Scheffe procedure identified means that were significantly different at the .05 level with a different letter superscript among groups. Means with the same superscript indicates no significant differences were found among groups.

The ANOVA procedure indicated significant differences at the .05 alpha level on the following variables in the 1998 data set: "More involved with curriculum", "Increased enrollment", "Agriculture program more positively viewed", "More opportunities for electives", "FFA viewed more positively as a co-curricular component", and "Easier to prepare for CDE's." The Scheffe post hoc procedure indicated teachers in Group II tended to agree that block scheduling helped them to become more involved with curriculum decisions, while the teachers in Group III possessed an impartial perception to the item. The Scheffe post hoc procedure also found teachers in Group II tended to be in agreement that block scheduling increased their overall enrollment and allowed more opportunities for electives, as well as helping the agricultural program to be viewed more positively. However, the teachers in Group I tended to be more neutral. The Scheffe post hoc procedure indicated teachers in Group II tended to be partially in agreement that FFA was viewed more positively as a co-curricular component of the agriculture program, while teachers in Group III tended to be partially in disagreement on this statement.

Finally, teachers in Group I tended to be more neutral to the variable of easier to prepare for CDE's, while the teachers in Group III disagreed.

Table 3 outlines the longitudinal differences between the 1996 and 1998 data sets. This table outlines the results of the third objective.

Table 3. Longitudinal Differences Among Teachers on Block Scheduling.

Variables	Group I (1996) (n=33) Mean	Group I (1998) (n=33) Mean	Group II (1996) (n=29) Mean	Group II (1998) (n=16) Mean	Group III (1996) (n=30) Mean	Group III (1998) (n=26) Mean
1. Curriculum Involve	2.45	2.73	2.54	2.25	2.80	3.27
2. Rapport	2.36	3.30***	2.93	3.00	3.26	3.38
3. Work Improvement	2.36	3.03***	2.55	2.50	3.10	3.31
4. Meet Student Needs	2.24	2.78**	2.45	2.50	2.90	3.08
5. More Plan Time	1.81	1.94	2.24	1.44***	2.20	1.88
6. Teaching Methods	1.81	2.03	1.79	1.63	1.77	2.00
7. Subject Matter	3.24	3.36	2.93	2.69	3.57	3.60
8. Transfer Students	3.27	3.40	3.32	3.25	3.27	3.54
9. Portfolios	2.24	2.66**	2.36	2.13	2.38	2.81*
10. Less Time Wasted	2.33	2.52	2.34	2.06	2.13	2.62**
11. Complete Lesson	1.78	2.16	2.07	1.94	2.07	2.27
12. Multiple Present	1.60	1.88	1.69	1.63	1.80	1.96
13. Enrollment	1.75	2.66***	1.66	1.44	2.07	2.04
14. Quality Students	2.70	2.78	2.48	2.25	2.70	2.92
15. Positive View	2.61	3.00*	2.52	2.31	2.76	2.92
16. More Integration	1.91	2.22*	1.97	2.00	2.17	2.35
17. More Courses	2.15	2.28	2.17	1.88	1.93	1.88
18. Co-op Programs	2.57	2.47	2.78	2.75	2.72	2.48
19. More Electives	1.72	2.47***	1.83	1.63	1.83	1.92
20. More Membership	2.76	3.06	2.72	2.69	3.17	3.23
21. More Females	2.33	2.44	2.48	2.13	2.67	2.38
22. More Minorities	3.12	3.28	3.10	2.94	3.14	3.12
23. FFA Co-curricular	2.52	2.84	3.07	2.50**	3.60	3.46
24. Prepare for CDE's	3.42	3.19	3.83	3.50	3.76	4.12*
25. Recordkeeping	3.15	3.13	3.24	3.13	3.57	3.92
26. More Participation	3.06	3.25	3.34	3.13	3.63	3.69
27. Yearly Students	2.00	2.06	2.18	2.13	1.89	2.00
28. Adversely Impacted	2.48	2.59	2.17	2.38	2.13	2.19
29. Flextime	2.83	3.27	3.19	3.33	3.38	3.81**
30. Students Informed	3.97	3.94	3.79	4.00	4.03	4.42*

Note: Response Scale: 1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly Disagree

*p<.10 **p<.05 ***p<.01

Objective 3: Longitudinal Differences

Group I (1-10 years of experience) Results

The perceptions of Group I teachers (1-10 years of experience) changed the most over the two-year study than any other group. Eight of the 30 variables analyzed were significantly different at different alpha levels as indicated in Table 3. The most dramatic changes occurred in the variables associated with "classroom instruction." In 1996, Group I teachers had a tendency to agree that block scheduling helped them build a "better rapport" with students ($p<.01$), but by 1998 this group took a more neutral stance. This was also true with the variable associated with "improvement in the quality of work by students." Other significant variables were "better able to meet student needs", "more time to work on portfolios", and "easier to complete a lesson" ($p<.05$). In 1996, Group I teachers tended to agree that block scheduling helped them better meet the needs of their students and found more time to work on portfolios as well as it was easier to complete a lesson, but as time progressed the group tended to be more neutral on these variables.

The variables used to collect data on the "agricultural education program" also found longitudinal differences in the teachers within Group I. In 1996, teachers fully agreed that block scheduling "increased overall enrollment" ($p<.01$), whereas in 1998 teachers became more neutral in their responses. Other significant variables within this category were "the school views the agricultural program more positively" and "more integration is allowed" ($p<.10$). In 1998, teachers tended to be even more neutral in their responses regarding the program being more positively viewed by the school. In 1996, teachers had a tendency to agree more that block scheduling allowed for more integration among subject matter than in 1998.

The variables associated with the "FFA" category were relatively stable for the teachers included within Group I. The only variable that was significant in this category was "increased FFA membership" ($p<.01$) due to the implementation of block scheduling. In 1996, teachers agreed that block scheduling increased FFA membership, while in 1998 teachers tended to be more neutral. It is also important to note that 24 of the 30 variables collected on Group I teachers (1-10 years of experience) over the two year period possessed a negative t-value.

Group II (11-20 years of experience) Results

The perceptions of Group II teachers (11-20 years of experience) changed less over the two-year study than any other group. Two of the 30 variables analyzed were significantly different at different alpha levels as indicated in Table 3. In 1998, this group of teachers were in stronger agreement that there was "more time for planning" ($p<.01$) because of the implementation of block scheduling than in 1996. As time progressed, this group also had a tendency to agree that "FFA viewed more positively as a co-curricular component of the agricultural program" ($p<.05$) while in 1996 they had the tendency to be more neutral. It is also important to note that 24 of the 30 variables collected on Group II teachers (11-20 years of experience) over the two year period possessed a positive t-value.

Group III (21 or more years of experience) Results

The teachers of Group III (21 or more years of experience) indicated that their perceptions had changed over the two-year study. Five of the 30 variables analyzed were significantly different at different alpha levels as indicated in Table 3. There were two variables that possessed significant differences within the category of "classroom instruction." In 1996, this group had a tendency to agree that block scheduling helped in "more time to work on portfolios" ($p<.10$), while in 1998 their tendency was to be more neutral. These perceptions were also true for the variable "less time being wasted" ($p<.05$).

There were no significant differences found in the variables included in the "agricultural education program" category within the teachers in Group III, but there were three significant variables in the "FFA" category. In 1998, teachers were in stronger disagreement that it was "easier to train for CDE's" and "easier to inform students about FFA" ($p<.10$) than in 1996. Finally, teachers in this group tended to agree that "flextime helped our FFA" ($p<.05$), but as time progressed their perceptions became more neutral. It is also important to note that 24 of the 30 variables collected on Group III teachers (21 or more years of experience) over the two year period possessed a negative t-value.

Conclusions and Recommendations

The following conclusions were drawn from the perceptual data retrieved from this research study:

1. Teaching experience is perceived to impact the perceived value of block scheduling on agricultural education programs among teachers.
2. Longitudinal impact of block scheduling varies with the amount of teaching experience.
3. Classroom instruction continues to be a positive aspect of block scheduling, while FFA and SAEP continue to be a primary concern among teachers.

The results of this study found negative perceptual changes for 24 out of 30 variables with teachers possessing 1-10 years of experience, but the negative changes resulted in more impartial rather than negative perceptions. Group I teachers only possessed 1 variable with a mean $\geq$ 3.50, but their responses over the two year period were still consistently negative according to the t-tests. In 1996, Group I teachers were very excited about the benefits of block scheduling. This group possessed 17 variables with a mean ≤ 2.50, but in 1998 this group possessed only 10 variables with a mean ≤ 2.50. The Group I teacher responses consistently regressed to a more impartial viewpoint. They weren't sure block scheduling was as beneficial as in the early stages of implementation. It was also apparent that this group was the most volatile group in the study. They possessed 8 significant variables that changed negatively over time, the most of any group. This may be an indication of the constant changes in personnel that plagues this group. Their indecisiveness reinforces the recommendation for continual pre-service and in-service training.

The Group II (11-20 years of experience) teacher perceptions were obverse when compared with their colleagues. Twenty-four of the 30 variables changed in a positive manner over the 2 year period. This group was also the most stable, because only 2 of the 30 variables were significantly different over 2 years. Both of these variables changed in a positive manner. In 1996, Group II teachers had 50% of their response means were ≤ 2.50. By 1998, this group was

even more convinced that block scheduling was impacting their overall program positively by revealing 63% of their response means were ≤ 2.50. These results should not be surprising in any way. This group is where a majority of state, school, and community leaders are found. They are more involved with school-related decisions as well as providing input into reform efforts.

The findings of this study also revealed negative changes for 24 out of 30 variables with teachers possessing 21 or more years of experience. The responses from this group of teachers consistently regressed in a negative manner as time progressed. The Group III teachers possessed the most disagreement responses and the least agreement responses than any other group analyzed in this study. In 1996, Group III teachers occupy 6 variables with a mean ≥ 3.50, which indicates signs of discontent with the implementation of block scheduling. By 1998, Group III teachers revealed 7 variables with a mean ≥ 3.50, which indicates an even stronger discontent over 2 year period. However, they do possess positive views towards curriculum changes (enrollment, multiple presentations, more time for planning, more electives, etc.), but consistently indicate the inability to change strategies to fit the setting. This finding was not unexpected. A reform process such as block scheduling occurs over a period of time. The preparation work necessary to implement new teaching methods occurs during the early years of the process, while perceived benefits are returned over a much greater time period. Group III teachers may be less willing to accept the changes in teaching methods necessary to implement block scheduling because they believe the costs in terms of their preparation work is greater than the benefits that will accrue during their remaining years of activity.

The results of this study also reveals that the FFA and SAEP components of agriculture education programs continue to be a concern for all teachers. While the data analysis documents the perceived adverse effects of these components, the responses to open-ended questions also reinforced this ideology. The biggest concern is communication barriers between teacher and students under the block scheduling system. Thirty-nine teachers indicated communication was an item that they like least about block scheduling. This was the most duplicated item outlined in the open-ended responses. This concern is also apparent in national membership numbers. The number of students enrolling in agricultural education courses continues to increase, while the number of FFA members is relatively stable. This marginal difference is becoming a major concern.

More studies need to be conducted on how teachers are addressing this communication barrier. Additional studies should also be conducted on the impact of block scheduling within agricultural education programs to constantly monitor perceptual differences. New studies could also be conducted to evaluate the perceptions of school administrators. Efforts must be made to continue in-service and pre-service programs on the implementation of block scheduling. The concerns associated with block scheduling must be further analyzed to evaluate if this scheduling system is a mere fad or a concept with longevity.

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A Longitudinal Study of the Impact of Block Scheduling on Agricultural Education Programs

A Critique

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This study reflects an issue that many agricultural educators have, are, or will be dealing with. This study gives us an idea of how secondary level agricultural educators in one state felt about the impact of block scheduling on their programs in 1996 and 1998. Conducting a longitudinal study was a real plus, but in my opinion our ability to make comparisons between 1996 and 1998 data is severely limited because of the fact that 1998 data do not represent the perceptions held by the population of teachers. The authors did a good job of highlighting some of the previous research on block scheduling and they did a good job of organizing their findings around the objectives for the study.

I have a number of questions and/or suggestions that the authors might find useful to enhance their report of this study. Background information on the status of block scheduling in the state (presumed to be Illinois) would be very helpful in framing the context for this study. When was block scheduling initiated? How widespread is its use and how is it typically organized? Understanding the context would facilitate a more complete understanding of the results and conclusions. Relatedly, the first section of the questionnaire asked whether respondents' schools were currently using or planning to use block scheduling. I found no report of this data. In fact, I wonder why comparisons were made based on years of experience instead of experience with block scheduling. Were all teachers who participated in the study qualified to comment of the impact of block scheduling? If my school is not on block scheduling, how should I respond to a statement that begins "as a result of block scheduling, I"?

Regarding procedures, the authors analyzed each Likert-type item on the questionnaire. I believe that it would have been wise to collapse this information into categories for analysis. For example, what was the overall mean score for classroom impacts, FFA impacts, and overall program impacts. This would have greatly reduced the number of significance tests done by the researchers. I counted 150 significance tests. Using the formula $(1-(1-a))^C$ and setting the alpha level at .05, the chance of committing a type one error is 99.95%. If the data had been collapsed and analyzed by subscale, Cronbach's alpha would have been an appropriate measure of internal consistency with one coefficient reported for each subscale. Finally, more information is needed concerning the comparison of early and late respondents. What was early and late, what variables were compared and at what level of significance?

Regarding conclusions, how can a conclusion be reached that SAEP continued to be a primary concern among teachers? I found no data on SAEP related issues. The authors recommended conducting research on how teachers are addressing the communications barrier created by block scheduling. I would encourage the authors to follow up on this recommendation and pursue other lines of inquiry that may lead to discoveries of how best to deliver agricultural education in schools that use block scheduling.

A Description of the Forms of Assistance and The Nature of Events Experienced By Beginning Secondary Agricultural Education Teachers In Minnesota

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Introduction and Theoretical Framework

The retention of quality teachers in the public school systems has been a topic of continuing concern. Between 1993-94 and 1994-95 there were 6.1 % of the teachers nationally who left the teaching profession. Of those who leave, only 3 out of 10 leave for retirement. (U.S. Department of Education, 1998). The current rate of retention of beginning teachers is only 50% - nearly one-half of all teachers will leave teaching before the end of their sixth year of teaching (Jensen, 1986: Curtis, 1985).

According to Schulman (1987), teaching may be one of the most difficult of all professions to master. Few other professions expect the first-year practitioner to immediately perform at the same level as his or her experienced colleagues. This pressure results in a transition from student to first-year teacher that is traumatic for many and has been referred to in the literature as "reality shock". (Marso and Pigge, 1987). Many education scholars agree that the first year of teaching is exceptionally challenging (Huling-Austin, Odell, Ishler, Hay, & Edelfelt, 1989; Veenman, 1984)

Research conducted in the 1980's found that beginning teachers are less confident, qualified, or competent than teachers who graduated in earlier years (Gardner, 1983)
New teachers often experienced difficulty with classroom management and discipline, student motivation, room and lesson organization, locating adequate teaching materials, understanding complex school systems and policies, and meeting the needs of individual students. (Veenman, 1984; Odell, 1986; Griffen, 1985).

In a descriptive study of eight beginning agricultural education teachers in Idaho, Mundt (1991) found many of the same problems and concerns. The most notable problems and concerns were the conditions of the physical facilities; classroom management and discipline problems; organizational issues; managing the FFA component; a need for more supervision and help from the principal; and determining curriculum scope, sequence, and pace. Additionally, the beginning teachers were quiet, frustrated, isolated, afraid, angry, confused, and generally lacked confidence.

Heath-Camp and Camp (1992) found that many schools did provide support activities for beginning teachers. However, nearly 25% of the beginning teachers were not given a curriculum guide and 25% were never observed or visited by the principal during their entire first year of teaching. In case studies of three beginning agriculture education teachers, Talbert, Camp, & Heath-Camp (1994) found that the important problems included student discipline, advising the

FFA chapter, preparing for multiple classes, managing the laboratory, ordering supplies, time management, lesson planning, and classroom/laboratory management.

In a study of state winners of the NVATA Outstanding Young Member Awards, Mundt and Connors (1999) also found many of the same concerns for beginning teachers. The primary concerns were: managing the overall activities of the local FFA Chapter, building support within the school system, balancing professional and personal responsibilities, recruiting and motivating students in agricultural education, using proper classroom management and discipline strategies, time management., organizing and managing safe and attractive facilities, and building support from parents, organizations and adult groups within the community.

Many of the problems experienced by the beginning teachers correspond with particular stages in the models of teacher development. Fuller and Brown (1975) suggest that there are three stages in the development of teachers (survival, teacher situation concerns, and pupil concerns). Waters (1988) followed a similar framework when he described a three-stage model for teacher professional development consisting of self, task, and impact.

Ryan (1986) conceptualized the development of teachers to include an initial fantasy stage, followed by survival, mastery, and impact. Furlong and Maynard (1995) have further proposed a five-stage model. The stages include early idealism, personal survival, dealing with difficulties, hitting a plateau, and moving on.

To increase retention and improve instruction during each stage, reformers have called for induction programs with mentors to ease the transition of beginning teachers into full-time teaching (Huling-Austin, 1990; Odell, 1986). Beginning teachers in induction programs improve in self-confidence and classroom management (Connor, 1984), lesson planning and discipline (Eisner, 1984), and specific behaviors such as voice inflection, eye contact, and review techniques (Huling-Austin and Murphy, 1987). Research results also indicate that teachers involved in induction programs have more positive attitudes toward teaching and plan to continue in the profession longer than those who have not participated in induction programs (Henry, 1988; Odell & Ferraro, 1992; Varah, Theune, & Parker, 1986).

Interest in beginning teacher induction programs has spread rapidly in the U.S.A. The occurrence of state-level induction activities increased from 14 states in 1983 to 47 states in 1988 (Defino and Hoffman, 1984; Neuweiler, 1988). In 1999, the percentage of beginning full-time public school teachers who had participated in a formal induction program during their first year of teaching had increased from 59% in 1993-94 to 65% in 1998. The report also indicated that 22% of the formal induction programs were 8 months or less; 66% were 9 months to one year, and 12% were more than one year (U.S. Department of Education, 1999).

Given the combination of factors outlined above, a teacher induction project for beginning agricultural education teachers was developed by the Minnesota Department of Children, Families, and Learning; the Minnesota Association of Agricultural Educators; and the University of Minnesota, Division of Agricultural, Food, and Environmental Education. Due to the relatively large number of beginning teachers and the diversity of backgrounds, programs, and local mentorship arrangements, the researchers needed to assess the features of the participants in the program. The assessment would allow for more effective planning, monitoring, and delivery of the teacher induction project.

Purpose and Objectives

The purpose of the study was to determine the nature of the events experienced and local assistance provided by school officials and local mentors by newly hired secondary agricultural education teachers in Minnesota. The objectives of the study were to describe the:

1. demographic characteristics of the agricultural education teachers;
2. nature and impact of the assistance provided to beginning agricultural education teachers by local school districts;
3. nature and impact of the events experienced by beginning agricultural education teachers; and
4. perceptions of the beginning agricultural education teachers relating to their levels of stress, satisfaction with their jobs, mentoring assistance provided by local school district officials.

Procedures

This census study was descriptive in nature. The population consisted of 19 self-selected beginning secondary agricultural education teachers who attended a seminar sponsored by the Minnesota Agricultural Education Teacher Induction Project.

The research instrument consisted of a questionnaire developed and tested by Heath-Camp and Camp (1988). The instrument was re-formatted to improve readability (different font, layout, and line spacing). The questionnaire consisted of three sections: demographics, form of assistance, and events. For listed items in the 'form of assistance' section, the subjects indicated whether the event had occurred (yes/not) and then selected an impact rating on a five point Likert-type scale. For the listed items in the 'events' section, the subjects indicated the frequency rating on a five point Likert-type scale and then selected an impact rating on a five point Likert-type scale. The internal consistency values reported by Heath-Camp and Camp (1992) were a Cronbach's Alpha coefficient of .74 for the OCCURRED/FREQUENCY scales and a Cronbach's Alpha coefficient of .88 for the IMPACT scale.

The questionnaire was distributed and administered in-person by the researchers to the participants at the seminar. Participants unable to attend the seminar were contacted by telephone and/or e-mail about being a part of the study. They completed the questionnaires and returned them via the mail.

The data from the questionnaire were entered into and analyzed in EXCEL©, a spreadsheet program from Microsoft™. Descriptive statistics were used to summarize the data from the three sections of the questionnaire.

Findings

Objective 1. Describe the demographic characteristics of the agricultural education teachers.

All 19 of the beginning agricultural education teachers participating in this study were part of a teacher induction program sponsored by the Division of Agricultural, Food and Environmental Education at the University of Minnesota, the Minnesota Department of Children, Families and Learning, and the Minnesota Association of Agricultural Educators. Local school districts were encouraged to promote and support the participation of the beginning agricultural education teachers in their school districts.

The mean age of the19 Caucasian agricultural education teachers participating in the teacher induction program was 25.4 (SD=5.24) years. Three teachers taught on a part-time basis. The cohort of 47% (n= 9) married and (53%) (n= 10) unmarried teachers was made up of (58%) (n= 11) females and (42%) (n= 8) males. Eleven percent (n=2) and 89% (n=17) of the teachers completed masters and bachelor's degrees, respectively.

The average length of contracts for the 16 full-time teachers was 10.5 (SD= 1.04) months. The average salary for the full-time instructors was $29,013 (SD= $2157). The beginning teachers were afforded two to thirty days to attend workshops and prepare for classes before the beginning of the fall term

Ninety five percent (n= 18) and 16% (n=3) of the teachers taught in Minnesota high schools and middle schools, respectively. The teachers taught in schools and communities with a variety of populations. Please see Table 1.

Table 1. Populations of Schools and Communities.

	F	%
Student Population of Schools[1]		
>250	4	21
251-499	6	32
500 – 999	6	32
1000 – 1999	2	11
2000 and greater	3	16
Populations of Communities[1]		
<2500	7	37
2501 - 9999	4	21
10,000 – 24,999	5	28
25,000 – 99,999	3	16
100,000 and greater	3	16

Note: [1] Total percentage greater than 100% due to some teachers teaching in more than one school.

One or more members of the beginning agricultural education cohort taught classes in grades seven through twelve. Ninety-five percent (n= 18) of the teachers taught students in grade 10-

12. Five percent (n=1), 21% (n= 4), and 74% (n=14) of the instructors taught students in grades 7, 8, and 9, respectively. All (n= 19) of the teachers taught agricultural education courses. Sixteen percent (n=3) taught a course or courses in biology or industrial and technology education.

The mean time in hours for teaching in-school students was 21.11 (SD=9.18) hours per week. Planning for teaching, grading papers, and other teaching roles accounted for 19.26 (8.77) hours each week. Completing non-teaching activities, such as working with the FFA and other committees occupied 7.17 (SD=6.78) hours of their weekly schedule. Supervision of student work experience beyond regular school hours required a weekly investment of 1.58 (SD=2.29) hours. The mean weekly investment for the full-time teachers was 54.88 (SD= 13.4) hours per week

Objective 2. Describe the nature and impact of the assistance provided to beginning agricultural education teachers by local school districts.

The beginning agricultural education teachers were asked whether each of the assistance items in the questionnaire had occurred in the first year. The four most frequently reported forms of assistance were planning time before school (100%), orientation on school policies (89%), new teacher workshop (84%), and parental support (83%). See Table 1. Fourteen of the twenty-two forms of assistance provided by local school districts were perceived to have a major or critical impact on the beginning teachers (mean impact rating = 3.50 or higher). Parental support (M=4.37, SD=0.60) for the agricultural education program along with adequate materials, textbooks, and provided workbooks (M=4.26, SD=0.73) were the top two situations perceived to have the greatest impact on the teachers. The lowest rated item was orientation to the vocational student organization (M=2.95, SD=1.43).

A comparison of the columns of data shows that the assistance items rated as major or critical were also among the most frequently reported. Of the fourteen items rated at an impact score of 3.50 or higher, nine were reported to have occurred by over half of the respondents. The extra planning period for beginning teachers was viewed by the cohort of beginning teachers to have a potential major impact (M=3.79, SD=1.23), though it was reported by only 5% of the respondents.

The assistance items rated as having a moderate impact (2.50 – 3.49) were also the least frequently reported. Of the eight items having a moderate impact, seven were reported to have occurred by less than half of the respondents. The workshops for new teachers were rated as having a moderate impact item (M=3.42, SD=0.96), although they were reported by 84% of the respondents.

Table 2. Forms of Assistance that Resulted in Various Levels of Perceived Impact for Beginning Agricultural Education Teachers.

Forms of Assistance	Impact[1]		Percent
	M	SD	Occurrence[2]
My students' parents provide support for my program	4.37	0.60	83
Adequate materials, textbooks, and workbooks are provided	4.26	0.73	74
Planning time was available before school started	4.16	1.01	100
Curriculum guides are available for my program area	3.95	1.22	42
My principal provided helpful evaluation and feedback	3.89	1.05	56
Extra planning period is provided for beginning teachers	3.79	1.23	5
Information on purchasing supplies/equipment is provided	3.79	1.08	53
Clerical support is provided for beginning teachers	3.79	1.03	42
A mentor or buddy teacher provided	3.74	1.10	63
A list of available resources and vendors was provided	3.72	1.13	37
An in-service on classroom management was provided	3.68	1.11	21
An orientation on school policies was given	3.63	1.01	89
An orientation tour of school facilities was given	3.58	1.30	58
Time is available to observe other teachers teaching	3.50	1.15	26
A teacher's aid is provided to beginning teachers	3.42	1.46	11
An in-service on time and stress management was provided	3.42	1.17	11
A workshop for new teachers was held	3.42	0.96	84
A beginning teachers' handbook was provided	3.37	1.12	42
Extra duties (bus, etc.) reduced for beginning teachers	3.21	1.44	26
An in-service on counseling students was provided	3.16	1.12	5
An in-service to explain the curriculum was provided	3.05	1.39	5
A Vocational Student Organization orientation was held	2.95	1.43	0

Note: [1] Impact Scale: 1 = None, 2 = Minor, 3 = Moderate, 4 = Major, 5 = Critical.
[2]Occurrence = percent of time reported by teachers.

Objective 3. Describe the nature and impact of the events experienced by beginning agricultural education teachers.

Seven of the 39 events experienced by the beginning teachers were perceived to have a critical impact (mean impact rating = 4.50 and above) on their teaching. See Table 3. A comparison of the two columns of data shows that all seven items rated as critical were also among the most frequently reported. All seven of the items rated as critical were also rated as often (mean frequency rating = 3.50 and above). 'I feel in control of my program', which occurred often (M=3.63, SD=0.68) had a critical impact (M=4.79, SD=0.42) on their experience. Other events that occurred often that had a critical impact included 'students act with respect towards me' (M=4.74; SD=0.56), 'I feel self confident in my classroom teaching' (M=4.74, SD=0.45), 'I experience satisfaction when an activity succeeds' (M=4.68, SD=.48), 'I see my students succeeding in my class' (M=4.68; SD=48), 'my principal supports me (M=4.63; SD=0.60)', and 'I have more work to do than I have time to do it' (M=4.53; SD=0.70). Twenty-six of the

Table 3. Events that Provided Various Levels of Perceived Impact on Beginning Teachers.

Events	Impact[2]		Frequency[2]	
	M	SD	M	SD
I feel in control of my program	4.79	0.42	3.63	0.68
Students act with respect towards me	4.74	0.56	3.79	0.54
I feel self-confident in my classroom teaching	4.74	0.45	3.74	0.73
I experience satisfaction when an activity succeeds	4.68	0.48	4.68	0.58
I see my students succeeding in my class	4.68	0.48	3.74	0.56
My principal supports me	4.63	0.60	3.84	1.30
I have more work to do than I have time to do it	4.53	0.70	4.63	0.68
My job allows me to be creative	4.42	0.61	4.37	0.68
I receive positive feedback from my principal	4.37	0.83	2.95	1.43
My peers act with respect towards me	4.37	0.68	4.26	0.73
The subject matter I teach is already familiar to me	4.37	0.60	3.53	0.61
I have insufficient funds for supplies and equipment	4.33	0.91	3.11	1.10
I see my students working to have a better future	4.32	0.82	3.00	0.58
I receive positive feedback from my students	4.32	0.75	3.06	0.64
Job tasks that I am doing are already familiar to me	4.26	0.73	3.53	0.77
My students show pride in their accomplishments	4.26	0.65	3.63	0.68
My students participate in vocational club activities (FFA)	4.26	0.56	3.58	0.61
I receive positive feedback from my peers	4.22	0.73	3.68	1.00
Local businesses provide support for my program	4.21	0.63	3.74	0.65
I have obtained the goals that I set for myself	4.16	0.96	3.42	0.61
My program is misunderstood by others; such as parents, students, counselors, and/or administrators.	4.11	0.99	3.47	0.90
I receive expressions of gratitude from my students	4.11	0.81	2.84	0.69
My students display a lack of self-discipline	4.05	0.78	3.37	0.83
I have inadequate facilities (classroom, lab, etc.)	4.00	1.25	3.53	1.07
I am taking classes to further my education	4.00	1.14	3.56	0.98
My home life is negatively affected because of my school work	3.95	1.39	3.00	1.11
I have inadequate curriculum materials	3.89	1.45	2.84	1.12
I have had success using new teaching approaches	3.84	0.96	3.63	0.60
I have to do recruitment activities for my program	3.84	0.96	3.11	0.99
My students act unmotivated towards my subject area	3.84	0.76	3.32	0.67
I have inadequate equipment	3.79	1.13	3.58	0.96
My class sizes are not appropriate for my subject	3.74	1.24	2.58	1.07
I receive help from my state vocational supervisor	3.63	1.21	2.74	0.99
I receive help from my local vocational supervisor/director	3.28	1.36	2.44	1.15
I have trouble making and sequencing lesson plans	3.28	1.36	2.26	0.81
I run into problems because my administrator does not give clear job expectations	3.11	1.45	1.84	0.96
I experience problems because I don't understand school policies or procedures	3.11	1.41	2.26	0.87
I run into problems because of my poor organizational skills	3.00	1.56	2.26	0.87
I am compared to the former teacher in this program	2.94	1.43	3.47	1.43

Note: [1] Impact Scale: 1 = None, 2 = Minor, 3 = Moderate, 4 = Major, 5 = Critical. [2] Frequency Scale: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Always.

39 events were perceived to have a major impact (mean score = 3.50 – 4.49) on their teaching. Twelve of those events were reported to occur often (mean frequency rating = 3.50 or above) and fourteen were reported to occur occasionally (mean frequency rating = 2.50 – 3.49).

As shown by the date in Table 3, fifteen events happened on an occasional basis (mean score of 2.50-3.49). Even though they occurred on an occasional basis, all events were perceived to have a major impact (mean score of 3.50-4.49) with the exception of 'being compared to the former teacher', which had a moderate impact. The five events that occasionally happened the least and had a major impact on the beginning teachers were 'receiving feedback from my principal', 'having inadequate curriculum materials', 'receiving gratitude from my students', 'receiving help from my state vocational supervisor', and 'inappropriate class sizes for my subject'.

Objective 4. Describe the perceptions of the beginning agricultural education teachers relating to their levels of stress, satisfaction with their jobs and mentoring assistance provided by local school district officials.

The teachers responded to their levels of satisfaction and stress by circling numbers of responses on seven point Likert-like scales. The mean score of 4.00 (SD=1.67) on the satisfaction scale (0=very unsatisfied and 7=very satisfied) indicates the beginning teachers were moderately satisfied with their teaching experience after the first seven to eight weeks of the fall term. The mean score of 5.47 (SD=.77) on the seven point Likert-like stress scale (0=low stress and 7=very high stress) indicated their perceived level of stress was high. Fifty-three percent (n=10) of the beginning teachers planned to remain in their current teaching position next year, 47% (n=9) stated they expected to do something else other than be teaching at another school.

Thirty-seven percent (n=7) of the beginning agricultural education teachers reported they were involved in a beginning teacher assistance program sponsored by their local school district. Of the seven teachers who reported being involved in a local mentoring program, six indicated that they were assigned a local teacher mentor, and four reported that they attended scheduled seminars or workshops for beginning teachers.

Conclusions, Recommendations, and Implications

The distribution with respect to gender (58% female and 42% male) of the beginning Minnesota agricultural education teachers was different than the findings reported by Heath-Camp and Camp (1992). Forty-nine percent of the participants in their beginning vocational teacher study were female and 51% male. The cohort of respondents was evenly distributed with respect to marital status, student population in schools, and community population. Beginning teachers were more likely to teach in grades 10 – 12 than in grades 7 – 9. Their primary responsibility was to teach agricultural education courses with a few beginning teachers having some teaching responsibilities in other fields. The beginning teachers invested nearly 55 hours (M=54.88, SD=13.40) each week completing their teaching and FFA advising tasks. The amount of time reported for teaching in-school students was similar to the amount of time planning lessons and grading papers.

The cohort of beginning Minnesota agricultural education teachers received many forms of assistance and experienced a variety of events that they perceived as having an impact on their teaching. There was variability in the frequency of occurrence of events and the forms of assistance provided the beginning agricultural education teachers.

The beginning teachers indicated that many different forms of assistance had an impact on their teaching. The forms of assistance with the highest perceived impact included parents, materials and textbooks, planning time, curriculum guides, principal feedback, clerical support and mentor teachers. The order of these findings is similar to the order reported by Heath-Camp and Camp (1992). They reported materials and textbooks, curriculum guides, principal feedback, planning time, orientations, and clerical support as the forms of assistance that had the highest perceived impact. The respondents in this study listed parent support and mentor teachers as items with a higher perceived impact than respondents in the Heath-Camp and Camp study. Both studies found that 'a vocational student organization orientation' had the lowest perceived impact and percent occurrence. Both studies also found that while beginning teachers rated 'extra planning period for beginning teachers' as having a major perceived impact, it was occurring substantially less frequently than the rest of the forms of assistance.

Events perceived as having major impact on teaching were related to control, student respect, self-confidence, personal, satisfaction and student success. Events perceived as having a major impact were found to be occurring with a high degree of frequency. Major impact events that occurred with a lower degree of frequency were related to feedback on performance and funds for supplies and equipment.

The respondents in the survey indicated a slightly higher rating for stress (5.47 on a scale of 0 to 7) than for job satisfaction (4.00). This is slightly different than the results reported by Heath-Camp and Camp (1992). The findings reported by Heath-Camp and Camp (1992) showed a slightly higher rating for job satisfaction (5.07) than for stress (4.40). Thirty seven percent of the beginning agriculture teachers in this study were involved in a beginning teacher assistance program sponsored by their local school district. This higher than the 25% reported by Heath-Camp and Camp (1992), but lower than the 65% reported by the U.S. Department of Education (1999).

Based upon the findings and conclusions of this study, the researchers offer the following recommendations for research and practice. First, due to the elevated levels of stress and dissatisfaction with the job, the perceptions of the beginning agricultural education teachers need to be monitored on a systematic and regular basis by school officials. Second, school leaders need to consider taking appropriate measures to respond to the preferred forms of assistance (e.g., active mentors, instructional materials and supplies, etc.) desired by the beginning agricultural educators. Third, school leaders need to be cognizant of the events and take steps to implement appropriate interventions to properly affect the desired levels of performance, job satisfaction, and stress.

Researchers need to continue to explore how the nature and scope of desired forms of assistance differs or remains the same with different cohort groups of beginning agricultural education teachers in the early phase of their teaching. Concurrent with these efforts, they need to determine if the nature and scope of the forms of assistance change as the beginning agricultural education teachers' progress through the steps of various models of the induction process (Furlong and Maynard, 1995; Waters, 1988; Ryan, 1986). Additionally, researchers need to compare the experiences, desired forms of assistance, and events of agricultural education instructors with other beginning career and technology education instructors.

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A Description of the Forms of Assistance and the Nature of Events Experienced by Beginning Secondary Agricultural Education Teachers in Minnesota

A Critique

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This study evolves out of a very serious need in agricultural education. I have heard many leaders in agricultural education proclaim that our most serious problem is the recruitment and retention of sufficient numbers of qualified agriculture teachers. The authors do an excellent job with the introduction. They establish the need for induction programs and provide a linkage to teacher development theory. In addition, the authors do a good job of organizing the findings around the objectives for the study. This study provides further insight to the profession concerning the experience of beginning agricultural education teachers.

I have a number of suggestions and/or questions that may be useful to the authors in developing an enhanced report of this research. When was the Minnesota induction program started? Was this study intended to gather data that might enhance an ongoing program? Regarding instrumentation, I found no evidence of validity and believe that Cronbach's alpha was not an appropriate measure of reliability. Data were analyzed item by item and not treated as if they could be summed up to measure one or more underlying concepts. Therefore, test-retest would have been the preferred measure of reliability. In addition, data on stress, satisfaction, and mentoring assistance were reported but no information was provided in the procedures section about the development of these instruments. The population for the study was identified as 19 self-selected beginning secondary agricultural education teachers who **attended** a seminar.... Later in the procedures section the authors note that participants unable to attend the seminar were contacted by telephone and/or e-mail about being a part of the study. So what exactly was the population, the sample, and the response rate?

The word impact was a key term used in this study. What specifically were the teachers asked to rate impact on? I noted at least three different objects of the perceived impact including (a) on beginning teachers, (b) on their teaching, and (c) on their experience. Furthermore, is this impact supposed to be positive? If so, were the responses to negatively worded statements on the "events" instrument reverse coded? The first mention of when this study was conducted occurred near the end of the findings section. Here I noticed that data were collected 7 or 8 weeks after fall term had started. Was this too soon? Would teachers be better prepared to assess the impact and occurrence of the forms of assistance and events after completing the school year?

I found a summary of findings, but really no conclusions. What does all of this information mean? Regarding recommendations, what exactly did you have in mind when you wrote that "due to elevated levels of stress and dissatisfaction with the job, the perceptions of the beginning agricultural education teachers need to be monitored on a systematic and regular basis by school officials"? Finally, I would suggest a rewording of the same paragraph so as not to imply that the events experienced by teachers have an "affect on the desired levels of performance, job satisfaction, and stress."

Barriers To Participation In Educational Programs As Perceived By Young Farmers

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Introduction/ Theoretical Framework

Educational programs serve as a medium by which scientific findings, skills, and knowledge are transferred from educational and research institutes to farmers to improve their productivity, profitability and living standard. Blackburn (1994) explained that program planners are concerned about a long-term goal, Extension agents are concerned about what they need to do next month, and farmers are concerned whether or not the program is worth attending. In order to achieve these goals, it is paramount that farmers participate in educational programs that are provided by Extension agents. Cross (1981) stated that it is as important to learn through research why adults do not participate in educational programs as to why they do. The list of barriers to participation in educational programs could be long, but most researchers put them in three major clusters: situational barriers, institutional barriers and dispositional barriers.

Situational barriers arise from everyday life. Some examples of situational barriers could be: shortage of time or getting too busy, shortage of money, lack of transportation, lack of support from family, family responsibilities and so on. Cross (1988) noted that lack of time deters a large number of potential learners in the 25 to 45 year old age group, while lack of money deters young people and lack of childcare deters young parents. Roger (1993) found the following four reasons for adults not attending educational programs: 1. "time is not convenient," 2. "can't take time from other duties," 3. "too far to travel," and 4. "irrelevant topic." Reed and Beaudin (1993) reported that personal problems, cost, personal priorities and lack of course relevance were barriers to adult participation in organized education.

Cross and Zusman (1979) revealed that the time problem is mentioned more by people in their 30s and 40s than younger or older adults and more often by highly educated, high income people than poorly educated, low income people. Jordan (1995) found that lack of time was consistently a top barrier to participation. Johnstone's and Rivera's (1965) findings that people who have time, lack money; and people who have money lack time to participate in educational programs.

Institutional barriers consist of procedures and requirements that are imposed on learners. Findings of Cross (1988) clearly indicate that an inconvenient schedule can easily exclude many adult learners from participation. The location, amount of time required, amount of money paid relative to the benefits and credits of the educational activities could be included in this group. Further more, potential learners complain most about inconvenient location and schedules and about the lack of interesting or relevant courses.

Dispositional barriers are closely related to self-perceptions and attitudes. These barriers may consist of age, level of education, lack of energy and motivation and lack of interest to sit in a classroom. Wilcox, Saltford, and Veres (1975) found that lack of interest was a leading barrier to participation. Cross (1988) stated that age clearly reveals certain social perceptions about the role of education at different stages of life. Eschenmann and Olinger (1991) findings showed that lack of motivation was a barrier.
Educational programs serve as a medium by which scientific findings, skills, and knowledge are transferred from educational and research institutions to farmers to improve their productivity, profitability, and living standard. "Interest in the literature on systematic planning has remained high throughout the intervening years because of the need to design educational programs—a complex decision process...." (Marriam and Cunningham 1989, p. 233)

Knowles (1984) argued that the process of adult education program planning should be based on the following criteria: 1) creating an appropriate and comfortable physical environment; 2) mutual planning of the learner and program planner; 3) participation in the decision-making and identifying their own needs; 4) learners should identify their own learning objectives; 5) individualizing instruction; 6) flexibility to adjust to conditions as they change; and 7) learners should evaluate themselves comparing their achievements with the original objectives.

Anderson and Darkenwald (1979) studied eleven variables that were associated with participation and persistence in adult education. They found that "only 10 percent of the variables associated with participation and persistence could be accounted for statistically. In other words, 90% of whatever it is that leads adults to participate in and drop out from adult education has not been identified by this or by other similar studies." (p.5) Cervero and Kirkpatrick (1990) studied the notion that previous education is the strongest correlate of participation and found that participants' educational attainment an unnecessary variable in explaining noncredit forms of participation. The inconsistencies in research findings and the need to increase adult learners' participation in educational programs through better programming calls for more research. Very little if any research has focused on barriers to participation in educational programs for young farmers.

Purpose and Objectives of the Study

The purpose of this study was to identify and analyze the perceptions of the members of the Young Farmers Educational Association regarding their level of participation in educational programs, participation in program planning and barriers to participation in educational programs. Specific objectives of this study were to: 1) identify barriers to participation in educational programs; and 2) identify factors that motivate farmers' participation in educational programs.

Methods and Procedures

The population for this study consisted of all the members of Iowa Young Farmers Educational Association during the summer of 1997. According to the records of the Iowa Young Farmers Educational Association, there were 148 members. The whole population was surveyed.

Data for this study were collected using a mailed questionnaire. The instrument for the study was developed by the researcher based on a literature review, interview information from five Iowa young farmers, and review and feedback from three-selected College of Agriculture faculty at the state university. The instrument was designed to measure farmer perceptions regarding motivation to learn, learning preference, motivational factors, and barriers to participation in educational programs. The first frame consisted of data on perceptions of motivation to learn by adult learners. This section had 11 questions. The second frame consisted of 4 questions that helped identify adult learner's preferred way of learning. The third section consisted of 10 questions that helped identify motivational factors to participate in educational programs. The fourth section consisted 9 questions that helped identify barriers to participation in educational programs.

The questions regarding motivation to learn, preferred approach to learning, motivational factors and barriers were formulated to be answered using a five-point, Likert-type scale with 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. The socio-demographic factors were formed into multiple-choice items. The instrument consisted of three pages and contained forty-five questions.

The reliability of the instrument was tested using selected adult learners in agriculture not included in the study. The alpha coefficient for the "barriers to participation" section was 0.83; and alpha for the "motivational factors" section was 0.74.

Data Collection and Analysis

The instrument was mailed to 148 Iowa Young Farmers Educational Association members during late summer. The first follow-up reminder letter was mailed ten days later to all participants who had not yet responded. The early response rate was 58%. The second reminder was mailed and generated a response of 103 (69.6%). To determine if there was a difference between the respondents and non-respondents to the written questionnaire, the researcher did a telephone follow-up survey of 22% of the non-respondents using the entire instrument. The t-test analysis indicated no significant differences between respondents and non-respondents. The Statistical Package for the Social Sciences (SPSS) computer program was used to analyze the data. Descriptive statistics consisting of means, standard deviations and percentages were used to describe the population.

Findings

Ninety-three participants provided usable data for this study. Over 91% (N=85) of the respondents were male, and less than 7% (N=8) were female.

The data in Table 1 presents the distribution of respondents by educational level. A majority of the respondents (over 95%) had high school or higher levels of education. Sixty-two percent of the respondents had a two-year college education or more. One respondent (1.1%) did not identify his or her educational level.

Table 1. Educational Level of Members of Iowa Young Farmers Educational Association. (N=93)

Educational level	Frequency	Percent
<12th grade	4	4.3
12th grade	31	33.7
12 + 2 years	28	30.4
12 + 4 years	19	20.7
17 or > years	10	10.9
Missing	1	1.0
Total	93	100.0

Note: A majority (87.1%) of respondents were between the age of 21 and 45. Less than 13% of the respondents were age 46 or older.

Only eleven (11.8%) of the respondents participated once a month in educational programs. Twenty-five (25.8%) respondents participated six times a year and 18 (19.4%) four times a year. Thirty (32.3%) respondents participated only twice a year. Nine (9.7%) respondents did not participate in educational programs at all. Over 33% of the respondents believed that their participation in program planning would increase their participation in educational programs. Twenty-two percent of the respondents did not believe that their participation in program planning would increase their participation in educational programs while forty-one percent of the respondents were unsure.

The findings in Table 2 indicate that "the lack of time" barrier had the highest mean rating (4.18) compared to the remaining statements. "Accessibility" was the second barrier, followed by "irrelevant material." The statement "I don't participate in educational programs because I am unaware of the possible programs" was fourth with a mean rating of 3.64. "Institutional credibility" was rated least among the barriers.

Table 2. Perceptions of Barriers to Participation in Educational Programs as Reported by the Members of Iowa Young Farmers Educational Association. (N=93)

Statements		Mean	Standard Deviation
I don't attend some educational programs because of:			
1.	Time	4.13	.83
2.	Accessibility	3.75	.85
3.	Irrelevant material	3.72	1.05
4.	Unaware of possible programs	3.64	.81
5.	Too much lecturing	3.58	.91
6.	Cost	3.53	1.03
7.	Negative previous experience	3.21	1.06
8.	Institutional credibility	2.89	1.07

Note: A Likert-type of scale 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

Data reported in Table 3 indicates the mean ratings and standard deviations regarding factors that may motivate educational program participants as perceived by members of the Iowa Young Farmers Educational Association. The top rated factor that may encourage participation in educational programs was "increasing profitability" with a mean rating of 4.35. Both "to learn the latest technology" and "to learn something new followed with the same mean rating of 4.29. All other ratings were relatively lower.

Table 3. Perceptions of Motivational Factors as Reported by the Members of Iowa Young Farmers Educational Association. (N=93)

Statements		Mean	Standard Deviation
I participate in educational programs:			
1.	To increase profitability	4.35	.74
2.	To learn the latest technology	4.29	.67
3.	To learn something new	4.29	.67
4.	Because of relevance	4.03	.68
5.	To increase my job options	3.76	1.04
6.	Because of its accessibility	3.76	.76
7.	Because of affordability	3.47	.88
8.	To maintain my job status	3.43	1.03
9.	Because of time convenience	3.33	.89

Note: A Likert-type of scale 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

Conclusions, Recommendations and Implications

The findings indicate that there is a minimal level of participation in educational programs by a large number of participants in this study. It is difficult, if not impossible, to achieve an educational goal among stakeholders with limited participation of the clients. The main barriers to participation for these farmers were lack of time, inaccessibility of the programs, irrelevant educational material and lack of information about the programs.

Several recommendations were made based on the findings and conclusions drawn from this study. Scheduling programs around the target farmers' schedules could eliminate the time barrier to participation in educational programs. Extension educators should involve clients in program planning to increase participation. Client participation in program planning would assist in finding ways to increase access, organize relevant material and advertise the programs. Program planners should interact with the farmers and identify real world challenges they encounter and design programs that would provide practical solutions to their problems; and program material must be of interest to farmers. Providers must make sure the educational material is based on the latest information and is relevant to the situation of potential participants. Providers must make sure that participants get something to take home with them.

It is recommended that further studies should be conducted that focus on a larger population. Use should be made of both quantitative and qualitative methods in order to compare the results and increase the reliability of the findings. The results of this study may have some relevance and application to farmers and Extension professionals. No matter what the subject matter or the issue, participation of the clientele is a primary factor if Extension is to succeed in facilitating learning. The findings of this study provide insights to program planners and Extension agents to help improve farmers' participation in educational programs. At very least, these findings encourage further research in this area.

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Barriers to Participation in Educational Programs as Perceived by Young Farmers

A Critique

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The results of this research add support to the literature of previously identified situational, institutional, and dispositional barriers to adult participation in educational programs. The population of this study was the total membership of the Iowa Young Farmer Educational Association. The authors are commended for conducting research in the area of adult education in agriculture.

Research methods and methodology used were clear and throughly documented. In relation to instrument validity, it would be interesting to know the questions asked of the five Iowa young farmers, and the area of expertise of the three College of Agriculture faculty who comprised the validation panel.

The results presented in tabular form directly address the objectives of the study. However, analysis provided through recommendation seems to be conservative, and in one case contrary to the results. The incident of disagreement relates to the recommendation supporting the need for participant involvement in program planning to assure greater program participation. It was reported that 63% of the respondents were unsure if their participation in program planning would increase their participation in resulting educational programs. The conservative nature of analysis speaks to the recommendation of further research without indicating some possible areas based on the results. Some of those areas might be: pursuing the factors of time, accessibility and relevancy through qualitative research, or profiling Iowa Young Farmers to determine their vested interest in farming as compared to motivations for educational programming.

Identifying Learning Styles of Iowa Young Farmers

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Introduction

For many years, researchers have studied learning styles; however, studies focusing on the learning styles of farmers are very limited. In many instances the content in continuing education, adult education, and even higher education is planned, developed, and delivered without regard for the learning style of the adult learner. Therefore, it is important that educational providers are aware of differences in learning styles among their adult student populations. Adult education providers, such as extension services, community colleges, and commercial entities, need to understand learning styles and the various methods and techniques to enhance learning.

Claxton and Murrell (1987) stated that the approaches to learning style could be examined at four levels: (1) personality, (2) information processing, (3) social interaction, and (4) instructional methods. They concluded that information about learning style can help faculty to become more sensitive to differences students bring to the classroom. Also, depending upon a teacher's purpose, understanding learning styles can serve as a guide in designing learning experiences to match the learning style.

Knowledge of learning styles is especially important in today's agricultural economy. The farm economy of today demands efficiency of effort and allocation of resources. Crop production has become highly technical with the advent of biotechnology, global positioning systems, and marketing options. Similar analogies can be made in livestock production. Farmers do not have the time or money to waste on ineffective training or education.

According to Kolb (1984), learning is conceived as a holistic adaptive process, providing conceptual bridges across life situations such as school and work and portraying learning as a continuous, life-long learning process. Claxton and Murrell (1987) stated that Kolb's theory deals not only with style but also the more basic question of learning and development. Drawing upon the experiential learning work of Dewey (1938), the active learning work of Lewin (1951), and Piaget's work (1952), Kolb described learning as a four-step process.

Apps states, "Lifelong learning goes well beyond the workplace...Lifelong learning also includes consideration of global issues such as social, economic, and environmental problems." (Apps, 1991, pp 2-3) Since information is doubling every four to five years, educational providers, according to Apps (1991), need to help adult learners make sense out of what information they currently have available before providing them more.

Educational providers, therefore, need to understand the learning styles of their adult learners for at least two reasons: namely, to plan and deliver more effective and efficient programs for their audiences, and to assist learners to sort and analyze the multitude of information that applies to them.

Purpose and Objectives

The purpose of this study was to establish baseline information regarding the distribution of learning styles among Iowa farmers. A secondary purpose was to establish for these same individuals their stated preferred learning mode for selected agricultural topics regarded as important to today's farming industry. The specific objectives of the study were:

1. To determine the learning style of Iowa farmers participating in this study using the Kolb Learning Style Inventory and to examine the distribution of these styles among the respondents.

2. To compare the learning styles of these Iowa farmers based on demographic characteristics.

3. To determine the perceived preferred learning mode of the respondents for selected agricultural topics.

This study is part of a five-year agricultural experiment station project focusing on the educational delivery of programs to farmers, particularly beginning farmers. Previous studies have focused on the educational needs of beginning farmers as perceived by themselves and by selected educational providers.

Procedures

The logistics of achieving a true random sample of the entire population of Iowa farmers was infeasible within the time and financial constraints of this study. As an alternative to a random sample, a purposive sample was conducted. Ary (1996) states that in purposive sampling (also known as judgment sampling) sample elements judged to be typical or representative are chosen from the population. The 1997 Census of Iowa Agriculture was used to compare sample respondent demographic data to the available known data for the population.

To conduct the survey, the Iowa Farm Bureau Federation provided assistance in distributing the survey instruments to members of their county leadership committees in all Iowa counties. The researchers guaranteed respondent anonymity to the Iowa Farm Bureau Federation, and, therefore, the researchers did not have access to the mailing list. Because of this process, a direct follow-up with non-respondents was not possible. A follow-up was done by sending all original recipients a reminder request to complete and return the survey. Also, the anonymity requirement prevented comparing non-respondents to respondents.

The survey was a self-administered mail survey. A total of 1100 surveys were mailed to these Iowa Farm Bureau Federation members in February 1999. The reminder was mailed approximately one month following the initial mailing. Three hundred sixty-four (33.1%) were returned and two hundred eighty-nine (26.3%) were useable for the study. Seventy-five (6.8%) were not useable due to large amounts of missing or incomplete data, in most cases entire sections were not completed.

In purposive sampling, a crucial question is arriving at a typical sample, according to Ary (1996). Since a random sample was not possible, the survey was designed to collect

demographic data from the respondents to be compared to Census of Agriculture (Iowa) data. Purposive sampling suggests a need to compare the sample to the population. Ary (1996) states that in many research situations the enumeration of the population elements, a basic requirement in probability sampling, is difficult, if not impossible. In these instances the researcher uses non-probability sampling, which involves non-random procedures for selecting the members of the sample.

A panel of experts – including agricultural education faculty and graduate students, Iowa Farm Bureau Federation staff, other adult educators, and farmers, reviewed the survey instrument. The farmers reviewing the instrument were not included in the sample. This review was conducted to insure the validity of the survey instrument. Minor adjustments were made following the initial review, based on recommendations given. A reliability analysis was completed on the useable responses for sections B and C of the survey instrument with the result of a Cronbach Alpha of .84 for each section.

The survey instrument was divided into four sections. Section A collected demographic data and characteristics of the respondents. Bracketed data rather than specific individual data were collected to help enhance anonymity and increase response rate. Section B was designed to measure the attitude of the respondents on twenty-six different statements regarding their education. A 5-point Likert-type scale was utilized. Section C of the survey was designed to determine the preferred learning mode, based on Kolb's descriptors, for nine different agricultural topics. The final section of the survey determined the learning style of the respondents based upon the Kolb Learning Style Inventory.

Useable surveys were received from 289 respondents. The useable surveys were returned from all nine crop reporting districts in Iowa. Table 1 shows the distribution of the respondents by crop reporting district. The lowest response was from west central Iowa (16 respondents, 5.54% of the total). All other crop reporting districts had at least 20 respondents. East central Iowa was the highest (45 respondents, 15.57% of the total). Thus, the response indicated a desired level of geographic dispersion.

The respondents were compared to census data using acres farmed as a measure of farm size. Census data for Iowa in 1997 showed that the average farm size in the state was 354 acres. Seventy-eight respondents indicated that they farmed between 321 and 640 acres. This represented the largest frequency in farm size groups and 26.99% of the total respondents. Thus, the survey respondents were similar to census data for all farmers.

Total farm sales for the respondents were compared to census data. Iowa agricultural census data for 1997 indicated that 51% of all Iowa farmers had annual sales of $50,000 or less per year. The survey sample indicated that 55% of the respondents fell in this category in 1998. Lower commodity prices in 1998 (some at record lows) would have likely increased the number of respondents in this category.

The average age of Iowa farmers in 1997 was 50.3 years according to census data. For the survey respondents, 53% were over age 46 and 46% were under age 45. Thus, the average age of the respondents was similar to the census data reported.

Analysis of Data

The demographic characteristics of the respondents are found in Table 1. Ninety-four percent of the respondents were male. Slightly less than half of the respondents were under 45 years of age while 24% were over 55 years of age. Over 75% of the respondents had 12 to 16 years of education while only 2.7% had fewer than 12 years of education. The respondents indicated their years of actual farming experience. Approximately 1/3 had 11 to 19 years of actual farming experience and 1/3 had more than 30 years of experience. Slightly less than 32% of the respondents had less than 11 years of experience. There was a fairly equal distribution of acres farmed. Approximately 29% reported less than 320 acres farmed, 27% farmed between 321 and 640 acres, and 31% indicated farming 641 to 1280 acres with the remainder reporting more than 1281 acres. In addition, the respondents were asked to indicate the location of the farming headquarters. All crop reporting districts were represented with a good distribution across the nine crop reporting districts in Iowa.

Table 1. Selected demographic characteristics of the respondents.

Characteristics	n	Pct of Total
Gender		
Male	273	94.14%
Female	16	5.52%
No Response	1	0.34%
Age		
<36 years	40	13.79%
36-45 years	96	33.10%
46-55 years	80	27.59%
>55 years	72	24.83%
No Response	2	0.69%
Years of formal education		
<12 years	8	2.76%
12-16 years	228	73.62%
>16 years	49	16.90%
No Response	5	1.72%
Years of actual farming experience		
<11 years	29	10.0%
11-19 years	62	21.38%

Table 1.(continued)

Years actual farming experience (continued)		
20-29 years	99	34.14%
>30 years	95	32.76%
No Response	5	1.72%
Acres farmed		
<160 acres	33	11.42%
161-320 acres	50	17.30%
321-640 acres	78	26.99%
641-880 acres	43	14.88%
881-1280 acres	51	17.65%
>1281 acres	29	10.03%
No response	5	1.72%
Farm location (Crop reporting district)		
Northwest	22	7.61%
North Central	40	13.84%
Northeast	38	13.15%
West Central	16	5.54%
Central	30	10.38%
East Central	45	15.57%
Southwest	23	7.96%
South Central	21	7.27%
Southeast	37	12.80%
No Response	17	5.88%

Each respondent was asked to complete the Kolb Learning Style Inventory. The Kolb LSI consists of twelve open-ended statements with four choices available to complete the statement. The respondent ranks the ending for each sentence on how well it fits with how he/she would go about learning something. One word in each item corresponds to one of the four learning modes – concrete experience, reflective observation, abstract conceptualization, and active experimentation. The LSI measures a person's relative emphasis on each of the four modes. Responses are summed to determine the "learning mode" which, in turn, is summed to a two-number combination to determine the learning style. Kolb identifies four learning styles: accommodator, diverger, converger, and assimilator. Kolb defines assimilators as persons who benefit little from unstructured 'discovery' learning such as exercises and simulations. Individuals with this learning style tend to be more interested in abstract ideas and concepts. Convergers, as defined by Kolb, tend to focus on solving problems and make decisions based on finding solutions to questions as contrast to divergers who view concrete situations at many different points of view. Divergers tend to approach a situation by observing rather than taking action. Accommodators, according to Kolb, have the ability to learn primarily from "hands-on" experience. They tend to act on instinct rather than logic. They rely heavily on people for information rather than their own technical analysis.

Table 2 shows the learning styles of the respondents. Two hundred eighty-one respondents (97.23%) completed the LSI. Of those respondents, the distribution of learning styles was as follows: accommodator (41; 14.6%), diverger (42; 14.9%), converger (60; 21.4%), and

assimilator (138; 49.1%). The learning style for eight respondents could not be determined because of incomplete responses.

Table 2. Kolb Learning Style for the Respondents

Learning Style	n	Pct. of Total
Accommodator (AC)	41	14.6%
Diverger (DI)	42	14.9%
Converger (CO)	60	21.4%
Assimilator (AS)	138	49.1%
No Response	8	

Table 3 shows a comparison of the learning style to selected demographic characteristics of the respondents. The demographic characteristics analyzed were: age, years of formal education, years of actual farming experience, and acres farmed.

Table 3. Respondent's learning style as compared to selected demographic characteristics*

Demographic Characteristic	AC n/%	CO n/%	DI n/%	AS n/%
Age				
<36 years	10/25.6	9/23.1	6/15.4	14/35.9
36-45 years	12/13.0	19/20.7	10/10.9	51/55.4
46-55 years	10/12.7	19/24.1	10/12.7	40/50.6
>55 years	9/13.0	13/18.8	15/21.7	32/46.4
Totals	41/14.7	60/21.5	41/14.7	137/49.1
Years formal education				
<12 years	0/0.0	2/28.6	4/57.1	1/14.3
12-16 years	38/17.0	44/19.6	31/13.8	111/49.6
>16 years	2/4.4	14/31.1	7/15.6	22/48.9
Totals	40/14.5	60/21.7	42/15.2	134/48.6
Years of actual farming experience				
<11 years	8/27.6	5/17.2	4/13.8	12/41.4
11-19 years	9/14.5	14/22.6	10/16.1	29/46.8
20-29 years	11/11.6	23/24.2	6/6.3	55/57.9
>30 years	12/13.0	18/19.6	22/23.9	40/43.5
Totals	40/14.4	60/21.6	42/15.1	136/48.9

Table 3. (continued)

	AC n/%	CO n/%	DI n/%	AS n/%
Acres farmed				
<160 acres	9/28.1	2/6.3	3/9.4	18/56.3
161-320 acres	8/16.3	9/18.4	6/12.2	26/53.1
321-640 acres	10/13.5	14/18.9	15/20.3	35/47.3
641-880 acres	3/7.0	14/32.6	4/9.3	22/41.2
881-1280 acres	4/8.2	13/26.5	9/18.4	23/46.9
>1280 acres	6/20.7	6/20.7	4/13.8	13/44.8
Totals	40/14.5	58/21.0	41/14.9	137/49.6

*Note: AC = accommodator; CO = converger; DI = diverger; AS = assimilator.
n = number reporting; % = pct of total reporting.

When the respondents were grouped by age, nearly half (49.1%) preferred the assimilator learning style followed by the converger learning style. The learning style preferred by the fewest number of respondents was the accommodator learning style. However, for young farmers (<36 years of age), there was a larger variation in the preferred learning style with slightly more than one-third (35.9%) preferring the assimilator style as compared to the accommodator style (25.6%) and the converger style (23.1%). The younger farmers were more equally divided in their choice of learning style than their older counterparts.

When grouped by years of education, the assimilator style was preferred for all of the respondents with 12 or more years of education with nearly half of the respondents in each group showing a preference for that style. However, for those respondents with less than 12 years of education over half (57.1%) preferred the diverger learning style.

Grouping the respondents by years of actual farming experience and acres farmed showed that for all categories, the assimilator learning style was dominant with more than 40% of all respondents within each category favoring this learning style. In many cases, more than 50% of the respondents favored the assimilator learning style when grouped by actual farming experience and acres farmed. The accommodator style was preferred by less than 15% of the respondents in many categories when grouped by actual farming experience and acres farmed.

Section C of the survey was designed to determine if the farmers perceived a preference in a learning mode for different agricultural topics. According to Kolb (1984), the learning mode is a simple test to help learners understand their strengths and weaknesses and how learners rely on these four modes to advance their learning in different learning situations. Nine agricultural topics were identified as learning situations and respondents were asked to indicate how they would "best like to learn" about each topic. The nine agricultural topics were: crop production practices, technology and management; livestock production practices, technology and management; farm markets, marketing strategies, pricing; financial management, records and analysis; machinery and equipment maintenance and repairs; building and facilities maintenance and repairs; whole farm planning and long-term decision making; resource conservation and sustainability; and technology transfer including computers, GPS, etc. The four learning modes were: learning by trusting your intuition, and feelings (concrete experience), learning by observing others (reflective

observation), learning by using logic and analyzing information (abstract conceptualization), and learning by doing and experimenting on your own (active experimentation). Table 4 shows the distribution of the respondents for each program topic and preferred learning mode.

Table 4. Preferred learning mode of the respondents for selected agricultural topics.

	CE	RO	AC	AE
	n	n	n	n
Agricultural topic	%	%	%	%
Crop production management	29	61	50	97
	12.2	25.7	21.1	40.9
Livestock production management	32	56	41	80
	15.3	26.8	19.6	38.3
Markets and prices	48	68	65	58
	20.1	28.5	27.2	24.3
Financial management	35	46	71	86
	14.7	19.3	29.8	36.1
Machinery & equip management	38	42	39	117
	16.1	19.3	29.8	49.6
Buildings & facilities mgmt	34	49	43	113
	14.2	20.5	18.0	47.3
Whole farm planning	42	38	96	63
	17.6	15.9	40.2	26.4
Resource conservation	42	74	65	58
	15.8	31.6	27.8	24.8
Technology transfer	30	81	44	71
	13.3	35.8	19.5	31.4

Note: CE = concrete experience; RO = reflective observation; AC = abstract conceptualization; AE = active experimentation. n = number reporting; % = pct of total reporting.

Nearly half of the respondents preferred active experimentation (learn by doing) for machinery and equipment maintenance and management and building and facilities maintenance and management (49.6% and 47.3%, respectively). Rating high for active experimentation were crop production practices and management and livestock production practices and management. Both were above 40% of the total respondents. This indicates a strong preference for learning by doing and experimenting on their own for these

agricultural program areas. Rating the lowest as a learning mode for these four topics was concrete experience (learning by intuition and feelings).

The farmers tended to prefer learning about whole farm planning and long-term decision making through abstract conceptualization (using critical thinking skills and logic) rather than active experimentation or concrete experience. Slightly more than 40% of the respondents preferred this mode for whole farm planning.

The farmers were more equally divided among the four learning modes for financial management and markets and prices. For financial management 36% of the respondents preferred active experimentation while 29.8% preferred abstract conceptualization; however, less than 15% preferred concrete experience. The differences were less pronounced for markets and prices with farmers about equally divided among the four learning modes. The most preferred mode for markets and prices was reflective observation (28%) and the least preferred mode was concrete experience (20.1%).

Regarding issues related to resource conservation and sustainability, reflective observation (learning by observing) rated the highest (31%) followed by abstract conceptualization (28%). This would indicate a desire to observe others or using thinking/logic to solve resource conservation and sustainability problems.

The farmers tended to prefer to learn about technology transfer by watching and listening and observing others (reflective observation) rather than the other learning modes. Thirty-five percent indicated reflective observation as their preferred learning mode. Ranking second in this category was active experimentation (31.4%). Least preferred was concrete experience.

Conclusions and/or Recommendations

The major purpose of this study was to establish baseline information regarding learning styles among Iowa farmers. A secondary purpose was to establish for these same individuals their preferred learning mode for selected agricultural topics. This data applies to the respondents.

The dominant preferred learning style for the respondents was the assimilator style. Nearly half of the respondents preferred this style. Individuals with this learning style tend to be more interested in abstract ideas and concepts and benefit little from unstructured learning such as computer simulations, interactive games, and the like. They tend to learn best by inductive reasoning and testing theories and ideas. They rely heavily upon abstract conceptualization and reflective observation as preferred learning modes. Assimilators grasp the experience through abstract conceptualization and transform it through reflective observation according to Claxton (1987). This implies that educational providers in agriculture should plan and implement educational programs that include inductive reasoning processes with particular emphasis on logic, ideas, and concepts rather than "learning by doing" and "feelings".

When the farmers were grouped by selected demographic characteristics, the preferred learning style was not greatly influenced by age, education, actual farming experience, or size of farming operation, except for young farmers who were more equally divided in their

choice of learning style. Likewise, farmers with less than 12 years of education preferred the diverger learning style. These findings might suggest that educational providers take a different approach to education for these groups, particularly younger beginning farmers, as contrasted to more established farmers.

An interesting aspect of this study was the preferred learning mode by the respondents for selected agricultural topics. Active experimentation was the preferred learning mode for most agricultural topics related to the management and maintenance of the physical farming resources and enterprises; crops, livestock, machinery, and buildings while abstract conceptualization was preferred for whole farm planning. Also, the farmers were equally divided in their preferred learning mode for financial management and marketing – those activities that require more abstract and critical thinking and judgment. In summary, it would appear that the topic had more influence on the preferred learning mode than the learning style.

This study was designed to gather baseline information on learning styles of Iowa farmers. Additional studies should be conducted to verify these results. Educational providers need further understanding of farmers' learning styles and topical affect in order to conduct meaningful educational programs for farmers.

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Identifying Learning Styles of Iowa Farmers

A Critique

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The researchers of this study have attempted a very ambitious project. Not only from volume of information collected and analyzed to address the research purpose and objectives, but also attempting to profile the Iowa farmer. The 1997 Census of Agriculture estimates that 94.5% of the market value of agricultural products sold from Iowa is produced by 49.8% of the farms which average at least $50,000 in market value of products. At what point do the motives of individuals involved in farming become primary to that occupation as a business compared to a family tradition or way-of-life? It seems difficult to justify being able to describe all individuals involved in farming by a singular term or definition. In attempting to profile the learning style of Iowa farmers, it may have been advisable to consider this factor to a greater degree in the theoretical framework of the study.

The purpose and objectives for the study were clear and well stated. The researchers followed an appropriate procedure to assure validity of the instrument, and an acceptable level of reliability was attained. The rate of survey response was definitely at a lower limit of acceptability. The researchers described their difficulty with attaining a greater response. A greater procedural concern is found with generalizing the results of this study to all Iowa farmers. The results of this study should not be generalized other than to members of Iowa County Farm Bureau Leadership committees. It could be assumed that individuals choosing to join a common organization share similar views on goals and objectives of the organization, and this commonality may focus to a greater extent through service on leadership committees. It is confusing to infer that based on farm size, annual sales, and farmer age that the sample used is representative of all Iowa farmers. Especially given the disparity between the percentage of farmers who actually produce the significant volume of agricultural products sold compared to the total of farmers involved.

The analysis and reporting of data for this study was an ambitious undertaking. The authors have done a thorough job of reporting the demographics, and correlating them to the preferred Kolb learning style. The learning mode of respondents is also thoroughly reported in relation to selected agricultural topics. What is the relationship of learning style to learning mode ?

In the area of recommendations, caution is advised of the authors in recommending particular learning strategies to the exclusion of strategies responsive to the learning styles of the minority. It is helpful to know the majority learning style of your audience. It is also prudent to recognize the preferred learning style of all learners, and plan instruction with variety which responds to a combination of learning styles.

Congratulations to the authors for drawing attention to the important consideration of learning style through this research effort.

Identification of Educational Needs Using Demographic and Psychographic Variables

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Introduction

Are the marketing strategies you use to promote courses and programs effective? How familiar are you with the variables that comprise your customer's segmentation? What it comes down to is, do you really know your customer's needs and wants or do you "assume" you know? In today's business environment knowing the composition of the market is critical to the success of the business. In an educational environment, often times identifying the market is not considered a high priority but should it not be? Marketing, as defined by Shoemaker (1998), is an exchange between two parties, and the exchange must be seen as a process, not as an event. Furthermore, Shoemaker defined exchange as a broader concept of the market. In this context, Kotler (1994) described an educational market as "all potential students sharing a particular need or want, who might be willing and able to engage in [classes] to satisfy that need or want" (p.11). By not applying market research concepts Shoemaker stated educational programs may not address the market requests or the local community needs. Shoemaker further asserted that in order to avoid this lack of market application it is critical that proper market research techniques be used to discover a proper "fit" with the region. What variables do you use in discovering the proper "fit"? This exploratory study focused on segment identification in which marketing strategies can be developed for rural areas.

Theoretical Framework

When a business focuses on a specific group it will carefully analyze their wants and needs then develop programs and products designed with those wants and needs in mind (Nickels and Wood, 1997). Marketing in the educational arena is sometimes different and often times marketed to the masses in hopes of "catching" people who are interested in their programs. This is so often the case in the promotion of off campus programs.

Nickles and Wood defined mass marketing as "the process of using one standardized strategy to market standardized products to everyone in the market"(p.220). They further elaborated that mass marketing assumes all the stakeholders have at least one characteristic so a mass-appeal marketing strategy is appropriate. Higher education prescribes to this particular strategy by using the marketing strategy of advertising anywhere and to anybody and which is commonly referred to as the "shot-gun" approach. The other type of generalized marketing is called target "rifle" marketing. Target marketing may be as simple as a new "student/customer orientation" for

the institution. This new concept has been the norm for many businesses and is fastly becoming the norm for much of higher education nationwide.

However, not everyone can be a stakeholder and there exists two different types of individuals. Nickles and Wood described the first type as people, who are potential customers, as prospects. The second type is categorized as those who are not potential customers and are termed nonprospects.

Market segmentation is the means in which the prospects and nonprospects can be identified. Nickles and Wood defined market segmentation as, "the process of grouping people or organizations within a market according to similar needs, characteristics, or behaviors (p. 220).

Blankenship, Breen, and Dutka (1998) stated three segmentation bases exist: consumer data, business and industry data, and geographic. They further stated consumer segmentation is based on a combination of demographic and psychographic information. Their general definition of demographics is the vital characteristics that define us such as: age, gender, marital status, occupation, education, and other characteristics covered by the census (Blankenship, p. 338). Psychographics are the psychological attributes that comprise a person's lifestyle. How do we live, do we enjoy what we do, how much do these attributes play in establishing our self-image, and how we want others to perceive us.

Research conducted over the past two decades have used demographic variables. Researches have examined the adult learner focusing on such variables as gender, age, income, occupation, years out of school, previous educational levels, career goals, and degree goals Graham (1986). Graham cited additional researchers have found that the previous educational background is probably the single most important factor in determining adult education participation. Furthermore, those who had completed education that is more formal were more inclined to enroll in additional educational opportunities.

Psychographics are a vital component in the development of a marketing strategy. Blankenship further explained the use of psychographics in addition to demographics as being critical because demographics do not entirely explain the motivations and actions of consumers. Consumers who are the same gender, age, income, and level of education categories do not feel the same about their community, educational opportunities, or development area (p.352). Kotler further defined the awareness of psyche needs as the ability for educational institutions to obtain insight in the selection of certain subject matter most relevant to the students and to help the students see how to get what they want.

Mortimer (1999) cited that a successful segmentation strategy is contingent upon the creation of a careful plan. He presented five steps in the segmentation process.

1. Establishment of segmentation objectives in objective form. The most common objective is the analysis of consumption patterns of education, technology, community lifestyle needs.
2. Specify the research focus by quantifying the size and scope of prospects. Questions such as who are the potential students. What are their interests, dislikes, educational interests, and motivations for continuing their education?

3. Establish if the market can be realistically segmented. Is the market large enough to be segmented in terms of prospects and geographical size, are there enough media outlets to reach the prospect cost effectively and do the prospects need your product, in this case education? Forming good segmentation is a mixture of science and art. A number of questions can be asked:
    - Are the segments apparently distinct from the initial review?
    - How many segments should be identified?
    - Is the data meaningful and supports the analysis?
    - Does each segment have its own personality?

    It is important the segments be large enough to support a market strategy and that the educational provider is aware of its size. A small community college maybe able to serve a specialized training atmosphere where as a large university will require a large segmentation to market effectively.
4. Select the segmentation basis. These are primarily physical and behavioral. By definition, physical segmentation is based on descriptive data while behavioral segmentation is based on lifestyle, attitudes, and feelings.
    - Physical variables are geographic and socioeconomic. Geographic variables identify the key area to be targeted. Demographic data is based on such items as age and gender with socioeconomic data from income, education, and occupation. Socioeconomic data is often times used in a consumer segmentation strategy and are applicable to the decision-makers within a business or educational unit. For example, a particular course subject may appeal to a certain socioeconomic characteristic of individuals involved in the service industry.
    - Behavioral characteristics are psychographics (lifestyle). These characteristics measure attitudes, feelings, interests, and outlooks. Segments are grouped according to similar views despite the differences in physical variables.
5. Choose appropriate data collection methods. There are two different types of data: primary and secondary. Primary data, as defined by Nickles and Wood (p.146), is the facts, figures, or details gathered for a specific marketing research study. Primary data is the best way to determine how best to satisfy your customers.

Purpose and Objectives

The purpose of this study was to establish current demographic and psychographics of residents in southwestern Iowa. A twenty county area consisting of the following counties: Adair, Adams, Audubon, Carroll, Cass, Clarke, Crawford, Decatur, Fremont, Guthrie, Harrison, Madison, Mills, Montgomery, Page, Pottawattamie, Ringgold, Shelby, Taylor, and Union. The following questions directed the study.

1. What are the demographic backgrounds and educational levels of the respondents?
2. What are the motives driving the need for education?
3. What type of course subject matter should be offered to the region?

Procedures

A descriptive study was used in this market segmentation study. The questionnaire was developed from fourteen focus group summaries. The focus groups were conducted approximately six weeks before the development of the questionnaire. The questionnaire was

designed to address community satisfaction, previous rural development strategies, motivation for pursuing additional education, barriers to participation, and technology usage specifically for southwestern Iowa.

This study was the research extension of a 1998 United States Department of Agriculture Fund for Rural America Telecommunication grant # 97362305163.

A stratified proportionate random sample was drawn from Iowa State University Extension lists, such as Master Gardener, crop and livestock programs, and from a random list of business owners purchased from American Business Information, Omaha, Nebraska. A total of 1,880 non-duplicated names and addresses were selected based upon the sample size stated in the grant proposal.

The development of the questionnaire was primarily driven by the results of focus groups conducted during August and September, 1998. The focus groups were comprised of a variety of interest areas including local producers, organic producers, bankers, agricultural business personnel, teachers, and community college students. Before a pretest was given, a panel of experts from the Iowa State University Sociology Department reviewed the instrument. The Committee on the Use of Human Subjects in Research at Iowa State University reviewed and approved the questionnaire and process. A draft of the questionnaire was pre-tested with twelve area residents. Modification and minor revisions were made to the instrument based on the comments from the pretest. A final version of the questionnaire was then produced. The questionnaire was divided into sections pertaining to the topic areas generated from focus group discussions and outlined in the grant proposal.

Identification of questionnaire participants was conducted from October 27-30, 1998. A pre-notification card alerting the participants of the forthcoming questionnaire on November 3, 1998. A cover letter, questionnaire, and a self-addressed envelope were sent on November 8, 1998 to 1,880 individuals. The first survey was returned on November 12, 1998. A second mailing to non-respondents occurred on December 8, 1998.

In an attempt to garner a higher response rate, newspaper advertisements and articles, as well as radio spots were purchased to encourage responses. Completed questionnaires were sent to the Department of Sociology at Iowa State University for data entry and analysis. Of the 1,880 questionnaire mailed, 64 were returned by the U. S. Postal Service as non-deliverable. Nine-hundred-ninety useable questionnaires were completed and returned for a useable response rate of 52.6%.

The data was coded as received and entered in to SPSS 8.0 version statistical software for analysis. Coding accuracy was preset at 5% random check by the data entry specialist. Data was reviewed periodically during the entry. Outliers were checked against the original document and corrected, if so necessary. Responses were plotted with no differences observed. Non-response error was determined by comparing early and late responders as outlined by Miller and Smith (1983).

For this study highest educational level was the primary block. As stated by Graham, the single most important factor in determining adult education participation is previous educational background.

Results and Discussion

Question 1: What are the demographic backgrounds and educational levels of the respondents?

Respondents came from a variety of occupations and educational backgrounds but were predominately male (65%).

Table 1 represents the mean age blocked on age groupings. Overall, 982 individuals responded to the question focusing on age. The mean age for all respondents was 51.6 years, slightly higher than the national mean age range of 25-50 years for rural adult learners. Of the 982 respondents, 65% were male. The mean age for male respondents was 51.79 years with a range of 21 to 84 and a standard deviation of 12.82 years. Female respondent mean age was 51.15 years with a range of 24 to 84 years and a standard deviation of 11.79 years.

Respondents indicating their marital status accounted for 86% from a sample of 836 responses. The percentage married was calculated using the information derived from the question, "what is your spouse's present employment status?"

Table 2 presents the mean age of respondents segmented by gender, employment status, and educational level. A majority of male respondents, employed full-time, possessed a high school diploma or less (38.8%) and have an average mean age of 52.68 years.

Female respondents in the same employment status typically possessed a high school diploma (41.3%) and have an average age of 51.20 years. Overall, the largest majority of respondents are employed on a full-time status, male (86%), female (60%).

The male respondents, who indicated part-time employment, have a considerable smaller percentage responding (81%) than those employed in a full time status. Males, who possessed a high school diploma or less, accounted for 65.5% of part-time respondents. Respondents in the high school or less category reported an average mean age of 65.52 years.

Table 1. Mean age of respondents.

Item		Male	f	%	Female	f	%
Age		51.79	639	65	51.15	343	35
	< 30 years	27.00	32		27.67	12	
	31-44 years	39.23	164		39.63	99	
	45-60 years	51.71	263		52.53	161	
	61-90 years	67.78	180		68.08	71	

Females also showed a smaller percentage employed on a part-time basis (24%). Females who indicated part-time employment status are equally distributed between those who possessed a high school diploma and those with some college or an Associate degree (37.2%) and had an average age of 53.28 years for high school diploma respondents and 48.97 years for some college or an Associate degree.

Overall, 8% of male respondents indicated retirement as their employment status with individuals who possessed a high school diploma having the highest percentage (64.8%) and an average mean age of 71.06 years. Females who have a high school diploma or less recorded the largest percentage (56.6%) and an average age of 69.23 years. Overall, females accounted for 7% of those who indicated retirement as their employment status.

Only one-fourth (248) of the respondents reported children under the age of 12 in their household.

Table 3 identifies respondent occupation by highest educational level. Nearly 25% of the respondents identified "farming" as their primary occupation and approximately 24% were employed in the "service" industry. Occupations included in the "service" consists of occupations that service based such as waitress or healthcare worker. Of the respondents who identified "farming" as their primary occupation, 29% possessed a high school diploma or less.

Occupations in the category of "other" included: blue collar occupations, seasonal, and other occupations considered being hard labor type occupations. This category accounted for the largest group of respondents with the educational level high school diploma or less (32.1%). "Other" was listed by some college and Associate degree group and respondents indicating Bachelor or Professional degree in the third and fourth selections (19.9%, 11.6%), respectively.

Respondents who have advanced degrees identified "professional" occupations (35.1%) as their primary occupation. The "service" industry accounted for 22.8% of the advanced degree occupations.

Table 2. Mean age of employment status by gender and highest educational level.

Item	Male			Female		
Employment Status	Educational Level	f	%	Educational Level	f	%
Full Time	1	209	38.8	1	81	41.3
	2	148	27.5	2	73	37.3
	3	181	33.6	3	42	21.4
Part Time	1	21	65.6	1	29	37.2
	2	6	18.8	2	29	37.2
	3	5	15.6	3	20	25.6
Retired	1	35	64.8	1	13	56.6
	2	15	27.8	2	5	21.7
	3	4	7.40	3	5	21.7
Homemaker	1	0	0.00	1	14	45.2
	2	0	0.00	2	9	29.0
	3	0	0.00	3	8	25.8

Note. Group definitions: Group 1 - High School degree or less; Group 2- Some college or Associate degree; Group 3- Bachelor or Professional degree

Table 3. Occupations of respondents by highest educational level attained.

Occupation	Group 1 n= 414	Group 2 n=292	Group 3 n=268	Overall N=974
Farming	120a	80	41	241
	29.0b	27.4	15.3	24.7
Management	38	39	31	108
	9.2	13.4	11.6	11.1
Professional	2	16	94	112
	.5	5.5	35.1	11.5
Service	90	78	61	229
	21.7	26.7	22.8	23.5
Self Employed	31	21	10	62
	7.5	7.2	3.7	6.4
Other	133	58	31	222
	32.1	19.9	11.6	22.8

a= frequency, b=percentage

Question 2: What are the motives driving the need for education?

Figure 1 graphically presents the motivational factors influencing the achievement of educational goals segmented by highest educational level. Respondents were asked to select the single most important motive for furthering their education. Total responses for each group are: high school diploma or less (187), some college or Associate degree (210), and Bachelor or Professional degree (206). Combinations of learning and goal-oriented questions were used to identify motivational characteristics. Overall, the primary motivation was "self improvement" across all three educational segments. However, when segmented by educational level the high school diploma or less responded with 58.8% with 110 respondents, some college or Associate degree 54.8%, with 115 respondents, and respondents who possessed a Bachelor or Professional degree accounted for 48.5% with a frequency of 100.

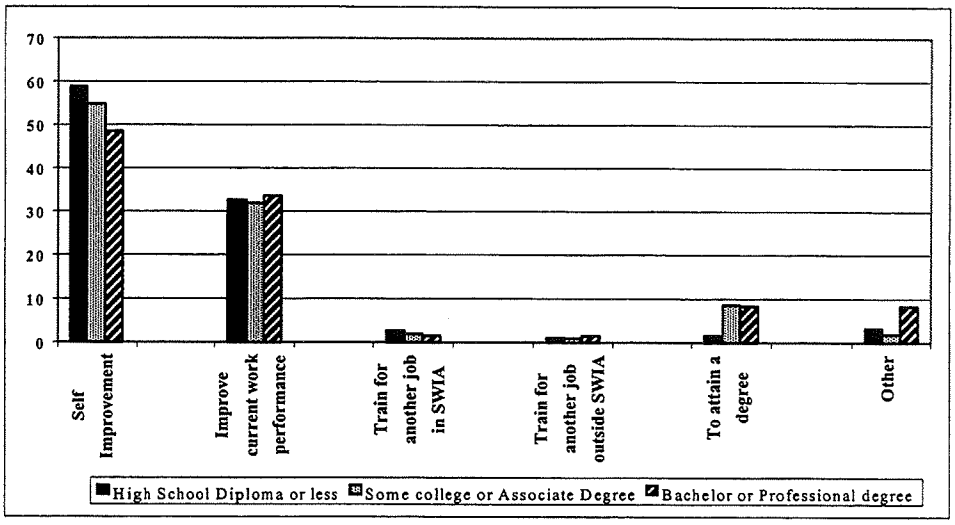

Figure 1. Motivational factors by respondents indicating interest in further educational opportunities by highest educational level. (Percentages reported on Y Axis)

"Improving current work performance" recorded the second highest response among the three educational levels. Across all three groups, percentages were approximately equal with the following percentages recorded for each group: high school diploma or less (32.6% with a frequency of 61), some college or Associate degree (31.9% with a frequency of 67) and Bachelor or Professional degree (33.5% with a frequency of 69).

Interestingly, individuals who had responded "to attain a degree" were recorded by persons who possessed some college experience up to those who possessed a Bachelor or Professional degree, 8.6% and 8.3%, respectively.

"Other" accounts for a mentionable percentage across all three groups. Due to the data entry, it is difficult to identify the motives identified in this category. Among the three groups, Bachelor and Professional degree recorded the highest percentage 8.3% with a frequency of 17, high school diploma or less recorded the second highest percentage 3.2% with a frequency of 6 and some college or Associate degree recorded a 1.9% with a frequency of 4.

Question 3: What type of course subject matter should be offered to the region?

Table 4 presents mean and standard deviations of the responses regarding educational opportunities blocked on highest educational level. Ordinal categories were used for respondents to rank their level of interest on the following scale: "very interested", "somewhat interested" and "not at all interested". The ordinal categories were recoded so that "very interested" carried a value of 3 instead of 1, "somewhat interested" remained at a value of 2 and "not at all interested" was recoded to possess a value of 1 instead of 3. Missing data was recoded to possess a value of 1. Educational opportunities focusing on computer training were most frequently selected being "very interested" or "somewhat interested" in by all three groups. Advanced Computer Training, Successful Teamwork, Business Management, Personnel Management and Personal Finance/Debt Management were indicated as areas in which two out of the three groups expressed interest in acquiring education.

The mean scores for each opportunity revealed a strong interest in each area and calculated a small standard deviation. Computer based educational opportunities received a range of mean scores from 2.48 to 2.82 indicating a strong need for computer instruction at all educational levels.

Business related educational opportunity range from 2.43 to 2.65 indicating a moderately very strong interest in subject matter in this area. Not to be surprised but as the level of education increases so does the desire for education to assist them in their employment as presented in table 3.

In addition, as the level of education increased so did the lack of need for personal financial education. Respondents who possessed an Associate degree or less indicated a need for personal finance/debt management and business management subject matter.
There appears to be a need for successful teamwork skills due to the response by high school or less and Bachelor and Professional degree respondents. One can hypothesize that this might be a result of these two groups being more involved in community activities.

Respondents were asked to evaluate educational opportunities provided by three entities: Iowa State University, area community colleges, and local business and industry. Using a scale from 1 ("very negative") to 5 ("very positive"), 73 percent of respondents rated area community college opportunities as a "4" or "5". ISU Extension received a rating of "4" or "5" from 50 percent of respondents, and local business and industry, 20 percent. Respondents were then asked whom they would feel most comfortable learning information from in the future.

Table 4. Identification of top five educational opportunities segmented by highest educational level of respondents who did not check no further educational interests.

Educational Opportunity	n	M	SD
*High school diploma or less**			
Introduction to Computers	181	2.82	.57
Business Management	174	2.59	.81
Successful Teamwork	173	2.56	.83
Personal Finance/Debt Management	176	2.50	.87
Advanced Computer Training	178	2.48	.88
*Some college or Associate degree***			
Advanced Computer Training	200	2.72	.70
Introduction to Computers	200	2.70	.72
Business Management	198	2.65	.76
Personal Finance/Debt Management	197	2.57	.82
Personnel Management	197	2.48	.88
*Bachelor or Professional degree****			
Advanced Computer Training	198	2.68	.74
Successful Teamwork	198	2.54	.85
Personnel Management	199	2.49	.88
Managerial Skills	198	2.48	.88
Leadership Skill Development	199	2.43	.91

Note. Scale: 1= Not at all Interested, 2= Somewhat Interested, 3= Very Interested

Forty-three percent indicated they would like to see a combined effort from ISU Extension, area community colleges, and local business and industry; 24 percent reported no preference, and 18 percent indicated a preference for area community colleges.

Conclusions, Recommendations, and Implications

This exploratory study found that the average rural adult learner in southwestern Iowa, is male, 51.79 years old, married, employed full time in the field of farming and possessed a high school diploma or less. The educational needs of the adult learner are in the areas of computer training, business management, successful teamwork skills, personnel management, and personal finance/debt management. The preferred source of education is the community colleges; however, a strong percentage would like to see a combined effort between higher education institutions, community colleges and business and industry. A significant number of people want additional educational opportunities to help "self improvement" efforts and "to improve current work performance". However, a significant number of people felt they had reached their educational goals or have no further interest in pursuing additional education (25%).

Educational institutions need to be innovative in the development of educational opportunities as well as how they meet the needs of the adult learner. Some possible ways include:

1. Develop agreements with business, community colleges, Extension, and Iowa State University to provide long-term learning centers strategically placed in the southwestern Iowa area.
2. Establish frequent communications among business and industry, Extension, community colleges, Iowa State University, and rural learners.
3. Conduct town hall meetings to keep current and to identify new emerging segments in the area of educational needs.

According to the findings in the study, the following conclusions can be made based on the responses of 990 Southwestern Iowa residents. Due to the focused sampling frame, finding needs to be interpreted only for those specific groups of people rather than to the entire adult population of Southwest Iowa.

1. Initiate meetings and focus groups, on a regular basis, with private industry, agribusiness, and small business owners to further identify the types of business education offerings they feel would be relevant to them. Rationale: Business related education was identified as the most sought after educational opportunity. With a large percentage of respondents in the service, management, and professional occupations business related programming is very relevant.
2. Conduct a discrete analysis to further identify segments in the area of motivations, barriers, and delivery techniques.
3. Incorporate the base line information gathered in this study to develop a model that identifies the educational needs, alleviates barriers, and strengthens the motivation of the respondents to participate. Additionally, the model needs to include a well-developed marketing plan, which follows the segment plan introduced earlier, involving business, community colleges, and communities.

4. Complete a discrete analysis focusing on the delivery of the programming. A detailed study focusing on current and possible partnership arrangements, as outlined in the grant proposal, with community colleges, four-year institutions, Extension, and business needs be conducted. Further study, to identify segments associated with technology, specifically as the delivery mechanism needs to be explored using the base line motivation segments related to that type of delivery.

The implications from this study are wide. Analyzing needs of a community, based on a segmentation approach, are not commonly used. Higher education needs to become acutely aware of the different segments within the broad groups that we tend to classify our clientele as. A segmentation strategy needs to be incorporated at all levels of education. We need to answer the five basic steps and then determine if we really know our prospects or are there variables that we overlook for the sake of believing we know our clientele.

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Identification of Educational Needs Using Demographic and Psychographic Variables

A Critique

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This is a very interesting study from several vantages. It focuses attention on the importance of affective variables in research, as well as providing a model study of market research which can be replicated for various purposes such as undergraduate recruitment.

The introduction presents the question related to proper fit between clientele want or need and product offering, and the theoretical framework lays out a strategy of market segmentation in response. Both are well written and lead to a clearly stated purpose for the study. The study was led by clearly stated research questions.

The procedures for the study are very well explained. An excellent protocol is followed in regards to questionnaire development, validation, follow-up, attention to non-respondents, accuracy in the recording of data, and an acceptable response rate was attained. However, there was no mention of instrument reliability. In the process of questionnaire development, it seems there was a market segmentation and a general list of needs established through the focus groups. How does this step affect the psychographic data of the study? It was well documented that highest educational level was an important demographic item. On what basis were the other demographic items selected? Were the counties included in the study considered homogeneous enough to not merit demographic consideration?

Results were clearly presented and spoke directly to the research questions leading the study. The answers sought through the purpose of the study were definitely obtained. The results provide an excellent source of information from which to address the recommendations offered. The recommendations offered support a positive collaboration of institutions to meet clientele needs, and provide direction of how to stay abreast of changing clientele needs, wants, and desires.

The researchers are congratulated for a well designed, administered, and thoroughly completed study.

An Analysis of the Professional Development Needs of Agriculture Teachers

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Introduction/Theoretical Framework

Agriculture teachers have had and continue to have a need for professional development. Professional development programs are often developed to reflect the current trends in education or new developments in the agriculture, food, and fiber industry. Professional development programs typically are designed for participation by all agriculture teachers, with some states conducting separate sessions for beginning teachers. Two questions must be asked: Are professional development in-service programs meeting the needs of all agricultural educators? Could professional development programs be created to more appropriately meet the needs of selected groups of teachers?

Research has been conducted to identy the professional development needs of beginning teachers of agriculture (Kahler, 1974; Hillison, 1977; Shippy,1981; Hachmeister, 1981; Claycomb & Petty, 1983; Birkenholz & Harbstreit, 1987; Valli, 1992; Garton & Chung, 1996). Beginning teachers indicated concern with discipline, motivation, dealing with individual differences, assessing students' work, relationships with parents, organization of class work, insufficient and/or inadequate teaching materials and supplies, and dealing with problems of individual students (Veeman, 1984). Items identified in the previous research reflected concerns related to pedagogical more so than technical content information. Researchers (Garton & Chung, 1996) found that beginning agriculture teachers rated technical agriculture competencies lower when compared to professional competencies in the areas of instruction, program planning and evaluation, and program administration.

While beginning teachers have specific professional development needs, the needs appear to change over time (Claycomb & Petty, 1983). Previous research identified the inservice needs of all agriculture teachers within selected states. Gamon, et.al. (1994) found that agriculture teachers needed training in agricultural environmental impact, natural resource management, government policy, impact of the global market, and the processing of agricultural products. Newman and Johnson (1993) studied agriscience competencies needed by agriculture teachers, and found the most pressing needs for in-service were in the areas of biotechnology, computers, and mechanical/physical technology. Neason (1992) considered agriscience competencies of agriculture teachers, and found plant science biotechnology was most commonly identified by teachers when identifying professional development needed. Briers and Edwards (1998) found entry-phase teachers rated their need for inservice greatest on competencies related to facilitating adult learning environments.

While previous studies primarily focused on technical agriculture issues, studies that examined the total agriculture program and teachers' responsibilities were not common. An examination of the professional development needs of agriculture teachers in relation to all areas of the agriculture program and curriculum should be conducted. Research is also needed to prepare and present professional development programs to meet the needs of agriculture teachers by level of experience and by geographic region within a state.

Purpose and Objectives

The purpose of this study was to identify the professional development needs of secondary agriculture teachers in Missouri. The specific objectives of the study were to:

1. Identify the professional development needs of secondary agriculture teachers.
2. Compare the professional development needs of secondary agriculture teachers by the six geographic districts in Missouri.
3. Compare the professional development needs of secondary agriculture teachers by years of teaching experience.

Methods and Procedures

Population and Sample

The target population for this descriptive study was secondary agriculture teachers in Missouri ($N = 385$). The accessible population consisted of teachers who participated in the annual state teachers' conference or attended the state wide fall workshops ($n=348$).

Instrumentation

The professional development needs assessment instrument was developed by the researchers based upon a review of the literature (Foxwell, 1987; Neason, 1992; Garton & Chung, 1996; Briers & Edwards, 1998). Fifty-three items were identified and grouped in the general categories of Program Planning and Instruction, Student and Teacher Development, Instruction and Curriculum, and Technical Agriculture. The instrument was reviewed by a panel of experts consisting of teacher educators, state supervisors, and agriculture teachers for face and content validity. Internal consistency for each of the four sections was established and ranged from .80 to .89 (Cronbach's alpha coefficient).

Data Collection and Analysis

The professional development needs instrument was administered at the teachers' summer professional conference. Instruments were administered during district meetings, with respondents signing a card indicating they had completed and returned the instrument, providing anonymity to respondents. Those teachers that did not attend the summer conference were given

the opportunity to complete the questionnaire during the fall state-wide workshops. The total number of usable questionnaires was 348, resulting in a response rate of 90.3%.

Descriptive statistics were generated on individual items. A descending list was generated to determine the items with the greatest professional development need, as was a descending list in each of the four topic categories. Similar lists were generated for each of the six geographic districts, and according to years of teaching experience.

Results and Findings

The first objective sought to identify the professional development needs of secondary agriculture teachers. The two items with the highest means among all agriculture teachers were using computer technology and computer applications (3.79), and writing grant proposals for external funding (3.78) (Table 1). The next three topics, in order, were changing the curriculum to meet changes in technology (3.75), computer applications in agriculture (3.7), and designing and modifying curriculum and course offerings to attract high quality students (3.69).

Of the 53 items, means ranged from 3.79 to 2.53. When considering the 13 items with the greatest need for professional development (top 25%) in relation to the four categories, there were six items classified in the Technical Agriculture category, four items in the Instruction and Curriculum category, three items in the Program Management and Planning category and no items in the Student and Teacher Development category. When considering the next 13 items (26%-50%), six items were in the Technical Agriculture category, three items were in the Student and Teacher Development category, three items were in the Instruction and Curriculum category, and one item was in the Program Management and Planning category.

Table 1. Perceived Need for Professional Improvement.

RANK	ITEM	Category	M	SD
1.	Using computer technology and computer applications	IC	3.79	1.10
2.	Writing grant proposals for external funding	PMP	3.78	1.15
3.	Changing the curriculum to meet changes in technology	IC	3.75	.94
4.	Computer applications in agriculture	TA	3.70	1.12
5.	Designing and modifying curriculum and course offerings to attract high quality students	IC	3.69	.94
6.	Advances in biotechnology	TA	3.58	1.05
7.	Landscaping	TA	3.54	1.13
8.	Animal reproduction - A.I. and embryo transfer	TA	3.52	1.20
8.	Building the image of agriculture programs and courses	PMP	3.52	1.03
10.	Greenhouse operation and management	TA	3.50	1.19
11.	Meat science	TA	3.49	1.05
11.	Recruiting and retaining quality students	PMP	3.49	1.09
13.	Motivating students - teaching techniques and ideas	IC	3.45	1.06
14.	Genetic engineering	TA	3.42	1.11
15.	Ag mechanics - large project construction	TA	3.41	1.18
16.	Managing learning laboratories (mechanics, horticulture)	IC	3.37	1.09
17.	Food science and food safety	TA	3.35	1.09
18.	Integrating agriscience into the curriculum	TA	3.34	1.01
19.	Developing SAE opportunities for students	STD	3.31	1.08
20.	Agricultural sales and marketing	TA	3.30	1.12
20.	Preparing for career development events	STD	3.30	1.08
22.	Natural resource management	TA	3.29	1.11
22.	Preparing proficiency and degree applications	STD	3.29	1.11
24.	Financial management	TA	3.26	1.09
25.	Teaching students problem-solving and decision making skills	IC	3.25	1.05
26.	Planning and maintaining a school land lab	PMP	3.24	1.15
27.	Tissue culture	TA	3.21	1.18
28.	Global positioning systems (GPS)	TA	3.20	1.26
29.	Supervising SAE programs - traditional and non-traditional	STD	3.19	1.08
30.	Floriculture	TA	3.15	1.19
31.	Tool and machine conditioning and repair	TA	3.12	1.16
32.	Developing business/community relations	PMP	3.11	1.03

Table 1. Perceived Need for Professional Improvement.(continued)

RANK ITEM	Category	M	SD
33. Electricity and controls	TA	3.10	1.12
33. Record keeping skills	TA	3.10	1.14
33. Small engine technology	TA	3.10	1.24
36. Establishing a working relationship with local media	PMP	3.09	1.05
36. Animal nutrition	TA	3.09	1.10
38. Soil science	TA	3.07	1.08
38. Time management tips and techniques	STD	3.07	1.18
40. Utilizing a local advisory committee	PMP	3.06	1.09
41. Water quality	TA	3.04	1.10
41. Evaluating the local agriculture program	PMP	3.04	.99
43. Planning and conducting FFA chapter activities	STD	3.02	1.05
44. Managing and reducing work-related stress	STD	2.98	1.18
45. Oxy-Acetylene welding and plasma cutting	TA	2.97	1.16
46. Conducting needs assessments and surveys to assist in planning the secondary and/or adult program	PMP	2.95	1.04
47. Managing student behavior	IC	2.90	1.02
47. Waste Management	TA	2.90	1.10
49. Enhancing and developing professionally	STD	2.86	1.12
50. Completing reports for local and state administrators	PMP	2.84	1.14
51. Planning and effective use of block scheduling	PMP	2.81	1.31
52. Organizing an alumni association	STD	2.71	1.17
53. Organizing a local FBMA (Farm Business Management Analysis) program	PMP	2.53	1.20

Note. Items rated on 5 point scale (1=No Need, 2=Some Need, 3=Moderate Need, 4=Strong Need, 5=Extreme Need). TA=Technical Agriculture, IC=Instruction and Curriculum, PMP=Program Management and Planning, STD=Student and Teacher Development

The second objective sought to compare the professional development needs of agriculture teachers by the six geographic districts of the state, as determined by the teachers' organization. The results indicated similarities and differences in the professional development needs between each of the six districts (Table 2). Only three items, using computer technology and computer applications (spreadsheets, presentation software, etc.), writing grant proposals for external funding, and changing the curriculum to meet changes in technology were ranked in the top ten for all six districts. The first ten items identified in the table represent items with the greatest need for professional development for the six districts combined. The remaining items in the

table denote topics identified by individual districts as a strong need for professional development, but not by the entire group. Computer applications in agriculture and designing and modifying curriculum and course offerings to attract high quality students were in the top ten for all but one district.

Table 2. Ranking of Professional Development Needs by Geographic Area of the State.

ITEM	Overall Rank	Northwest	Northeast	Central	South Central	Southwest	Southeast
Using computer technology and computer applications	1	4 (3.7)	3 (3.9)	1 (3.9)	9 (3.4)	3 (3.8)	1(3.9)
Writing grant proposals for ext. funding	2	1 (3.9)	6 (3.7)	4 (3.7)	1 (3.9)	2 (3.8)	9 (3.6)
Changing the curriculum to meet changes in technology	3	2 (3.8)	1 (3.9)	2 (3.8)	3 (3.6)	7 (3.6)	5 (3.7)
Computer applications in agriculture	4	3 (3.8)	5 (3.7)	3 (3.7)		5 (3.8)	2 (3.8)
Design / modify curriculum and course offerings to attract quality students	5	7 (3.6)	2 (3.9)	5 (3.6)	2 (3.7)	6 (3.7)	
Advances in biotechnology	6	7 (3.6)	3 (3.9)		6 (3.5)		
Landscaping	7	5 (3.7)				8 (3.5)	3 (3.8)
Animal repro. - A.I. / embryo transfer	8			8 (3.6)	10 (3.4)	1 (3.9)	
Building image of agriculture programs and courses	8		10 (3.6)	9 (3.6)	5 (3.5)	9 (3.5)	
Greenhouse operation and management	10		8 (3.6)	10 (3.5)			7 (3.6)
Recruiting and retaining quality students	11		7 (3.7)		3 (3.6)		
Meat science	11	10(3.5)				4 (3.8)	
Food science and food safety	17					9 (3.5)	
Motivating students - teaching techniques and ideas	13		8 (3.6)	6 (3.6)	8 (3.5)		
Natural resource management	22						4 (3.7)
Ag mechanics - large project construct.	15						5 (3.7)
Record keeping skills	34	6 (3.6)					
Agricultural sales and marketing	20						9 (3.6)
Financial management	24						7 (3.6)
Global positioning systems (GPS)	28			7 (3.6)			
Genetic engineering	14				6 (3.5)		

Note: Rank (Mean)

The final objective sought to compare the professional development needs of secondary agriculture teachers by years of teaching experience. Teachers were divided into four categories. The four categories were five years or less, six to 10 years, 11 to 20 years, and more than 20

years of teaching experience. Of the ten items with a high overall need for professional development, only five were identified by all teachers, regardless of years of experience. The five items were writing grant proposals for external funding, changing the curriculum to meet changes in technology, computer applications in agriculture, designing and modifying curriculum and course offerings to attract high quality students, and landscaping (Table 3). Using computer technology and computer applications (spreadsheets, presentation software, etc.) was a professional development need for all teachers with the exception of teachers with five years or less experience. Recruiting and retaining quality students was ranked as very important by teachers with five years or less experience and by teachers with more than 20 years of experience, but not teachers from six to 20 years experience.

Table 3. Professional Development Need by Years of Experience.

Item	Overall	5 or less	6-10	11-20	More than 20
Using computer technology and computer applications	1		1 (3.7)	1 (4.1)	1 (4.0)
Writing grants proposals for external funding	2	1 (4.0)	10 (3.4)	4 (3.6)	3 (3.9)
Changing the curriculum to meet changes in technology	3	3 (3.7)	2 (3.7)	3 (3.7)	2 (3.9)
Computer applications in agriculture	4	6 (3.6)	5 (3.6)	2 (3.9)	6 (3.6)
Designing and modifying curriculum and course offerings to attract high quality students	5	4 (3.7)	4 (3.6)	6 (3.6)	4 (3.7)
Advances in biotechnology	6		9 (3.5)	5 (3.6)	5 (3.7)
Landscaping	7	8 (3.6)	8 (3.5)	9 (3.4)	7 (3.6)
Animal reproduction - A.I. and embryo transfer	8	5 (3.7)	6 (3.6)	10 (3.3)	
Building the image of agriculture programs and courses	8	9 (3.6)		7 (3.4)	
Greenhouse operation and management	10	10 (3.6)	7 (3.5)		10 (3.6)
Recruiting and retaining quality students	11	2 (3.7)			9 (3.6)
Meat science	12		3 (3.7)		8 (3.6)
Motivating students - techniques and ideas	13	7 (3.6)			
Ag mechanics - large project construction	15			8 (3.4)	

Note: Rank (mean)

Conclusions, Implications and Recommendations

Agriculture teachers indicated that their greatest need for professional development was in using computer technology and computer applications, writing grant proposals for external funding, changing the curriculum to meet changes in technology, computer applications in agriculture, and designing and modifying curriculum and course offerings to attract high quality students. These results would imply that there is a stronger perceived need for professional development in

the area of instruction and curriculum rather than technical agriculture, program management and planning, and student and teacher development.

When considering professional development needs according to geographic areas, there were many similarities among five of the six districts, with the Southeast district identifying distinctly different items than the other districts. Seven of the top ten areas ranked by teachers in the Southeast district were categorized as technical agriculture. The only items ranked in the top ten of all districts were using computer technology and computer applications (spreadsheets, presentation software, etc.), writing grant proposals for external funding, and changing the curriculum to meet changes in technology.

Determining professional development needs according to years of teaching experience revealed there were similar needs. Teachers with five years or less experience did not feel as strongly about the need for professional development in using computer technology and computer applications, possibly reflecting the increased usage of computer technology in pre-service education. These same teachers identified computer applications in agriculture as an important need, indicating these teachers feel comfortable using computers and general software programs, but are not as comfortable with the applications used in the industry of agriculture. Professional development needs changed slightly as years of experience increased. Young teachers indicated slightly stronger professional development needs in the categories of instruction and curriculum, and program management and planning, more so than technical agriculture which was similar to the findings of Claycomb and Petty (1983).

Recruiting and retaining quality students was identified by teachers with five years or less experience, and more than 20 years experience. This finding would imply that teachers with little experience are concerned about recruiting students into their program, while the most experienced teachers are also concerned about their abilities to relate to students in recruitment efforts.

Considering the mean scores of the highest ranking items for the entire group, no items ranked above 4.0, indicating a strong need for professional development. The absence of scores above 4.0 leads one to consider whether the correct items were considered, or were teachers generally prepared in all areas. On the questionnaire, blanks were provided for respondents to suggest topics for professional development not included on the instrument. Of the 348 instruments returned, 14 other topics were suggested, but none were identified by more than one respondent, which implies the instrument adequately represented topics for professional development.

When planning professional development activities, the state's professional development and in-service committee should use the results of this study to prioritize and plan the professional development offerings for teachers. In determining topics to address, items ranked in the top 25% by all teachers should be selected first, and moving to the second 25% when feasible and possible. Time and resource constraints will limit the number of sessions offered, and a systematic follow-up should be conducted to determine if and how the needs have changed. Missouri has already planned professional development institutes focusing on technical agriculture issues, and should focus on those items categorized as technical agriculture that had

the greatest need. If resources allow, consideration of district needs should be considered in planning professional development activities solely for that individual district.

Further research is needed to determine if the findings of this particular state are similar to other states, and if the needs according to years of experience are similar to other states. Further research in this state should be conducted to determine why the South Central district's results are markedly different from other districts.

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An Analysis of the Professional Development Needs of Agriculture Teachers

A Critique

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Determining the professional development needs of teachers is a continuous challenge. In this era of great change in agricultural and communication technologies it is difficult to maintain, let alone advance, one's skills and knowledge in all areas of the curriculum. The authors have chosen an important area of investigation that requires constant review. One study can not provide the final answer to the questions our profession has regarding professional development. However, this study does provide some information that should be useful in planning programs of professional development of teachers in Missouri. The study may not provide any new information, but it does confirm findings in other studies of this kind.

While I believe the overall procedures used in conducting the study were sound, it would be helpful to have more information in two areas. First, the development of the instrument deserves more explanation. How was this list of topics actually derived? There seemed to be a wide array of topics presented in sort of a shot-gun list. Was this how the questionnaire appeared? It seems curious to me that other very contemporary topics were not on the list e.g. entrepreneurship, products and processing, forestry and wildlife management. Secondly, the collection of the data needs a bit more explanation. Is it correct that data collection occurred at two different times? Does this in anyway affect the response to the questions? How many responded in the summer compared to the fall? You referred to the fact that no item was rated 4 or above. The explanation you gave seems weak at best. If the items that the 14 people wrote in had been listed on the original questionnaire, how do you know these items wouldn't have rated highly on the scale? There is no way of knowing.

In referring to the delivery of inservice programs the authors seem to imply that these topics must be delivered as stand alone areas of professional development. Why? Isn't it possible to integrate topic areas and use a balanced approach to achieve multi-faceted goals? Using computer technology in appropriate ways is certainly tied to agricultural subject matter. It could be said that the reason these items were rated as they were is that teachers may be indicating an integration of the topics is necessary.

A couple cautionary notes for the authors include the questionable use of the word "rank" in the conclusions section. Rating and ranking are not the same thing. Also tables 2 and 3 in the paper I reviewed had format problems and it was difficult to understand the labels/titles. Finally, what assurances do we have that studies of this kind have long term applicability? This statement isn't to suggest that studies of this nature shouldn't be conducted. It is to suggest however, that caution needs to be noted when interpreting the results.

The authors should be commended for continuing the search for answers to the professional development question. The real question is, are we going about it the right way?

The Relationship Between Students' Learning Styles, Instructional Performance, and Student Learning

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Introduction

Research has shown that as individuals students are unique in many ways, including their learning styles (Witkin, 1973; Gregorc, 1979; Jacobs, 1990). Schroeder (1993) concluded that students were entering institutions of higher learning with more diversity in their learning styles. Research has also concluded that an instructor's learning style directly influences his/her teaching style (Witkin, Moore, Goodenough, & Cox, 1977; Dunn & Dunn, 1979). The learning styles of students, their academic performance, and the relationship they have with an instructor's teaching style has been emphasized in higher education (Schroeder, 1993; Claxton & Murrell, 1987)

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). Others (Dunn & Dunn, 1979; Garger & Guild, 1984) have described learning style as the educational conditions under which an individual is most likely to learn. Witkin (1973) also indicated that an individual's learning style influences preferences for particular teaching strategies and learning environments. Furthermore, research has suggested that teachers prefer to teach in the same manner that they learned (Witkin, 1973; Dunn & Dunn, 1979; Gregorc, 1979; Lyons, 1984; Avery, 1985).

In the investigation of learning styles, the field-dependence/field-independence learning style construct has been one of the most extensively researched (Kogan, 1971; Guild & Garger, 1985). Chickering (1976) specifically noted that the field-dependence/field-independence construct had major implications for university faculty who make decisions about learning environments and practices. Within this learning style construct, individuals are categorized as having a preference for a field-dependent, field-neutral, or field-independent learning style. Field-dependent learners thrive best in structured social environments, think globally, have difficulty solving problems, and are extrinsically motivated (Table 1). Field-independent learners prefer individual effort and study, are analytical thinkers, enjoy problem-solving and tend to be intrinsically motivated (Witkin, et al., 1977). Individuals classified as field-neutral typically possess characteristics of both field-dependence and field-independence (Garton, et al., 1999).

Table 1. Learning and Teaching Style Characteristics.

Field-Dependent	
Learning Style	Teaching Style
• Perceives globally • Makes broad general distinctions among concepts • Demonstrates a social orientation; learns best in social context • Requires externally defined goals and reinforcements • Needs provided organization	• Teaching situations allowing interaction and discussion • Uses questions to establish student learning • Uses student-centered activities • Viewed as teaching facts • Provides less feedback, avoids negative evaluation • Strong in establishing a warm and personal environment
Field-Independent	
Learning Style	Teaching Style
• Perceives analytically • Makes specific concept distinctions, little overlap • Demonstrates an impersonal orientation • Interested in new concepts for their own sake • Has self-defined goals and reinforcement • Can use self-structured situations	• Prefers impersonal teaching situations • Uses questions to introduce topics • Uses teacher-oriented learning situations • Viewed as encouraging to apply principles • Gives corrective feedback, uses negative evaluation • Strong in organizing and guiding student learning

Garger, S. & Guild, P. (1984, February). Learning styles: The crucial differences. Curriculum Review, 9-12.

Just as an individual's learning style influences the way he/she cognitively constructs meaning to subject matter, learning style also influences a teacher's style of teaching. According to Witkin (1976) ". . . it is easy to see that a teacher's cognitive [learning] style may influence his/her way of teaching." Field-dependent and field-independent teaching styles are consistent with those characteristics of field-dependent/independent learning styles (Cano, 1993). Field-dependent teachers typically are very student-centered, establish a warm personal learning environment, and avoid the use of negative feedback (Witkin, Moore, Goodenough, & Cox, 1977). Conversely, field-independent teachers generally have a subject-centered classroom, assume an authoritarian atmosphere, and guide students through the learning process

Learning style has been found to be an important variable in students' academic achievement, how students learn and teachers teach, and student-teacher interaction (Witkin, 1973). Because of the diverse learning styles found of students entering institutions of higher education, it is crucial for instructors to identify learning style differences and to incorporate teaching strategies that address the learning needs of all students. Based upon students' preferred learning styles, research findings have been applied to assist educators in developing compatible instructional methods (Keefe, 1982; Keefe & Ferrell, 1990). However, 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).

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; Garton, Dauve, & Thompson, 1999; Garton et al., 1999). Additional studies have suggested that students' learning style influences their cumulative grade point average (Torres, 1993; Torres & Cano, 1994). The previously identified research has focused on describing how different groups of students learn and their overall academic performance. However, modest research has been conducted to connect students' learning styles to instructors' teaching styles and methods. Research is warranted that assesses an instructor's ability to adapt his/her teaching style to meet the diverse needs of students.

Purpose and Objectives

The purpose of this study was to identify relationships that existed between students' learning styles, a teacher's teaching performance, and students' performance in an upper-level horticulture course. The specific objectives of the study were to:

1. Describe students' preferred learning styles.
2. Describe the relationship between students' preferred learning style and the instructor's teaching performance, as perceived by students, at mid-semester and at the conclusion of the course.
3. Describe the relationship between students' preferred learning style and academic performance in the course.

Procedures

The population for this correlational study consisted of an intact group of students enrolled in a plant propagation course (n=31) at the University of Missouri.

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 a split-halves (Spearman-Brown reliability coefficient of .82).

Students rated the instructor's teaching performance at mid-semester and conclusion of the 16 week course using a university instructor evaluation. The instructor evaluation was a standardized evaluation that had been previously assessed for validity and reliability.

Analysis of Data

The GEFT was administered to all students enrolled in the plant propagation course during the second week of the semester. One instructor, possessing a field-dependent learning style, and consequently teaching style, taught the course. At the time of this study, the instructor for the horticulture course titled 'Plant Propagation' was participating in the College of Agriculture, Food and Natural Resource's Teaching Scholars program. Following the mid-semester evaluation, the course instructor discussed the results with an Agricultural Education faculty member knowledgeable and experienced in adapting teaching styles based on students' learning styles.

Descriptive statistics were calculated on GEFT scores, university instructor evaluations (mid-semester and final), and student performance as measured by scores in the lecture and lab portion of the course. Lecture grades for the course were based on two hourly exams and a comprehensive final examination, four quizzes, and nine random attendance scores. Laboratory grades were based on a daily plant care grade (based on a 12 week time period), 22 laboratory reports, two quizzes, and one comprehensive final laboratory examination. Pearson product-moment correlation coefficients were calculated between the variables of interest and were interpreted utilizing Davis' (1971) descriptors.

Results

An analysis of the preferred learning styles of students enrolled in the plant propagation course indicated a range of GEFT scores from 3 to 17 with an overall mean score of 13.16 ($\underline{SD} = 3.82$. Within this group of students, 19% ($\underline{n} = 6$) preferred a field-dependent learning style, 26% ($\underline{n} = 8$) preferred field-neutral, and 55% ($\underline{n} = 17$) preferred a field independent learning style.

The second objective sought to describe the relationship between students' learning style, using GEFT scores, and the teaching performance of the instructor as perceived by students on a mid-term and final evaluation (Table 2). The mid-semester evaluations ranged from 4.57 for "instructor is very knowledgeable of subject matter" to 3.69 for "instructor feedback regarding subject matter." The relationships between mid-semester evaluation and student GEFT scores ranged from a moderate positive correlation ($\underline{r} = .46$) for "instructor available for extra help when needed" to a low negative correlation ($\underline{r} = -.13$) for "instructor's ability to present alternative explanations." The positive correlations indicated that as students' learning styles moved toward field-independence their rating of the instructor was more positive. Conversely, a negative correlation indicated that as students' learning style moved toward field-independence their rating of the instructor was less positive.

Table 2. Relationship Between Learning Style and Teacher Performance as Perceived By Students.

Teacher Performance Assessment Item [a]	Mid-Semester Evaluation		Final Evaluation	
	Mean (SD)	r	Mean (SD)	r
1. The instructor's organization of the subject matter has made it easy to follow.	4.10 (.76)	.17	4.45 (.81)	-.34
2. The instructor's explanations have been easy to understand.	4.07 (.64)	-.03	4.42 (.68)	-.37
3. The instructor's voice has been clear and easy to understand.	4.47 (.68)	-.04	4.71 (.46)	-.30
4. The instructor's ability to present alternative explanations has been effective.	4.00 .64	-.13	4.35 (.66)	-.38
5. The instructor's use of examples and illustrations have been helpful.	4.17 (.53)	-.01	4.52 (.68)	.11
6. The instructor has been enthusiastic (excited) about teaching.	4.20 .76	.05	4.58 (.56)	.08
7. The learning (course) objectives have been clearly communicated.	3.80 (1.16)	.01	4.19 (.98)	-.14
8. The instructor has been available when extra help was needed.	4.30 (.79)	.46	4.71 (.46)	-.04
9. The instructor is very knowledgeable of the subject matter.	4.57 (.57)	.01	4.47 (.44)	-.23
10. The assignments/projects have been helpful in learning the course content.	3.90 (.84)	-.12	4.39 (.84)	-.06
11. The instructor has provided feedback regarding my learning the subject matter.	3.69 (.76)	-.12	4.13 (.85)	.01
12. The instructor's examinations have contributed to my learning the subject matter.	3.90 (.61)	.01	4.45 (.57)	-.26
13. How would you rate the overall teaching effectiveness of the instructor? [b]	4.10 (.76)	-.06	4.58 (.56)	-.13

[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

The final evaluation of the instructor's teaching performance, as perceived by students, ranged from a mean of 4.71 for "instructor's voice is clear and easy to understand" and "instructor available for extra help" to a mean of 4.13 for "instructor has provided feedback regarding my learning of subject matter." The relationship between the instructor's final evaluation and GEFT scores revealed a low positive correlation (r = .11) for "instructor's examples and illustrations were helpful," and moderate negative correlations for "instructor's voice was clear and easy to understand" (r = -.30), "instructor's organization was easy to follow" (r = -.34), "explanations were easy to understand" (r = -.37), and "alternative explanations have been effective" (r = -.38). A positive shift was identified between the instructor's mid-semester and final evaluations on all means with the exception of, "instructor is very knowledgeable of subject matter" (midterm M = 4.57: final M = 4.47).

A low positive relationship (r = .20) existed between students' GEFT scores and their performance on exams and quizzes in the course (Table 3). A negligible positive relationship (r = .07) existed between student GEFT scores and their performance in laboratory practicums, and a low positive relationship (r = .11) was found between students' GEFT scores and their overall course performance.

Table 3. Relationship Between Students' Learning Style and Performance.

Variable	X_1	X_2	X_3	X_4
Learning Style GEFT (X_1)	1.0	.20	.07	.11
Exam/Quiz Percentage(X_2)		1.0	.57	.81
Lab Practicums Percentage(X_3)			1.0	.94
Course Percentage (X_4)				1.0

Conclusions and Recommendations

A majority of the students enrolled in the plant propagation course preferred a field-independent learning style. This finding was consistent with previous research that 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 13.2, which was nearly two points above the established norm of 11.4 (Witkin, et al., 1977).

There was a moderate positive relationship on the instructor's mid-semester evaluation between students' learning style and the item regarding the availability of extra help when needed. This finding would imply that students leaning toward a field-independent learning style tended to rate the instructor higher on the item. Conversely, students leaning toward a field-dependent learning style tended to rate the instructor lower on the item. Prior research has indicated that students with a field-dependent learning style express a greater need for assistance out-side of class time. Because of the relationship it was recommended to the course instructor at mid-semester to clearly communicate to the students that the instructor was available to assist students with extra help when needed.

There were moderate negative relationships on the instructor's evaluation of teaching performance at the conclusion of the course between students' learning styles and the following items: 1) organization of subject matter, 2) clarity of explanations, 3) clarity of voice, and 4) ability to present alternative explanations. This finding would imply that field-dependent students rated the instructor higher than field-independent learners on these four items. Although relationships existed, the instructor's teaching performance, as perceived by students, improved from mid-semester to the completion of the course on all four items.

Student perceptions of the instructor's overall teaching performance increased from the mid-semester evaluation to the final evaluation conducted at the end of the semester on 12 of the 13 items. This finding would imply that the modifications made by the instructor at mid-semester had a positive influence on the students' perceptions of the instructor's teaching performance.

Low positive relationships were found between students' learning styles and their performance on exams and quizzes, and in their overall course performance. 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.

Students' learning styles were analyzed to assist the instructor of the plant propagation course in meeting the instructional needs of all students. One method of assessment was the use of a mid-semester and end-of-course evaluation by students. Further investigation into this line of inquiry should address the following questions: 1) What instructional changes can be made to meet the individual needs of all students? 2) How can changes in instructional techniques affect field-dependent/independent learners? and, 3) How can providing mid-semester instructor feedback impact students' overall perception of a course and instructor?

Clearly the implications for this study lie in the purpose of agricultural education faculty at the university level. Those faculty trained in teacher education should be involved in the improvement of teaching performance by faculty in colleges of agriculture. This study provides one more link toward this goal, and provides a basis to examine how learning styles, instructional performance, and student learning are related in colleges of agriculture.

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The Relationship Between Students' Learning Styles, Instructional Performance & Student Learning

A Critique

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Investigations involving the determination of student learning styles are too numerous to count. This is not necessarily a negative statement unless the question is asked regarding use of the information. Many of these studies can be categorized as mere descriptive and informative reports about which few if anyone does anything. So the learning styles have been described, how are we going to use the results? Perhaps this study comes closer than most in trying to use the theory behind learning styles in an actual situation that also looked at instructional performance and student learning. The results in this study show that the relationships of these areas of inquiry are less than strong and seem to indicate that more is going on here than the data may have shown.

It is interesting to note that the instructor used what most specialists in educational processes would characterize as narrowly focused student performance indicators – exams, quizzes, attendance scores, and lab reports. What does this information tell us about the students' opportunities for learning and demonstrating achievement? What we as instructors expect in regards to course requirements and activities and assignments often reveals more about the potential for learning in our courses than our style of instructional presentation.

Additionally, the literature review in the paper is about learning styles, but the study also involved instructional performance and student learning. Shouldn't there have been a more balanced review of the literature among the three topics investigated? The title of the paper would indicate an equal treatment of the topics. It is not clear what the theory base is in this study after reading the whole paper.

Other questions emerge from this study indicating a concern about the conclusions. Did evaluations of instruction change because of the changes in instruction or could it have been the students were impressed with the instructor's attempt to do a more effective job and that in turn influenced the evaluations? Is it image or is it real, form or function, style or substance? Some evaluators might say it doesn't matter, there was change. However, serious evaluators of learning and teaching processes would say it matters a lot.

Clearly the study addresses some interesting dimensions of teaching and learning and the factors associated with these processes. There was a lot going on in this study and it is not clear that any definitive conclusions can be drawn based on the number of foci the study seemed to have. However, it is true that we need to answer the one question the study poses quite sharply: "What instructional changes can be made to meet the individual learning needs of all students?" Perhaps this study helps in some way to answer this question. Further studies are needed to more sharply focus our attention on that question and that perhaps will help all of us put information about learning styles in proper perspective in relation to all other factors.

Factors Explaining Job Satisfaction Among Faculty In The College of Food, Agriculture, and Environmental Sciences At The Ohio State University

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Introduction and Theoretical Framework

"Managers, supervisors, human resource specialists, employees, and citizens in general are concerned with ways of improving job satisfaction" (Cranny, Smith, & Stone, 1992). Judge, Hanisch, and Drankoski (1995) supported the submission of Cranny et al., by advising that it was imperative for human resource managers "to be aware of those aspects within an organization that might impact most employees' job satisfaction, and to enhance those aspects because, in the long run, the results will be fruitful for both the organization and the employee" (p. 576). Lastly, Rosnowski and Hulin (1992), submitted that the most informative information to have about an employee in an organization was a valid measure of their overall level of job satisfaction.

The urgency of a valid measure of job satisfaction, as proposed by Rosnowski and Hulin (1992), was possibly the motivation behind the numerous research efforts pertaining to job satisfaction. According to Brief (1998), by 1976 there were more than 3,300 research articles and dissertations published on job satisfaction. Two decades later, the desire to comprehend the antecedents and consequences of job satisfaction continued. Brief added that by 1994, more than 12,400 research articles and dissertations had been published on job satisfaction. The elusive nature of the job satisfaction construct advanced the measurement and theoretical development pertaining to job satisfaction.

Some theories of job satisfaction included discrepancy theory (Locke, 1969), equity theory (Adams, 1965), and the motivator-hygiene theory (Herzberg, Mausner, & Snyderman, 1959). Discrepancy theory, as described by Lawler (1973), was the result of the difference between an actual outcome a person received and some other outcome level. A comparison in which an actual outcome level was lower than another outcome level would result in dissatisfaction (Lawler, 1973). Inputs and outcomes were the premise of equity theory (Mowday, 1992). Employees evaluated their inputs/outcomes by comparing them with the inputs/outcomes of other individuals. Equity existed if the ratio of inputs to outcomes was similar to the inputs and outcomes of other individuals. Conversely, inequity existed when the ratio of inputs to outcomes was unequal to the inputs and outcomes of other individuals. Perceptions of equity were associated with job satisfaction, while perceptions of inequity were associated with job dissatisfaction. The motivator-hygiene theory was credited with propelling and advancing research on job satisfaction (Steers & Porter, 1992).

The premise of the motivator-hygiene theory (Herzberg, Mausner & Snyderman, 1959) was that jobs had specific factors which were related to job satisfaction or dissatisfaction. The five factors thought to facilitate job satisfaction were achievement, recognition, work itself, responsibility, and advancement. The five factors identified by Herzberg et al., as determinants of job dissatisfaction were company policy and administration, supervision, salary, interpersonal

relations, and working conditions. Subsequent research efforts (Bowen, 1980; Padilla-Velez, 1993) defined the motivator and hygiene factors as hypothesized by Herzberg et al. Following is a description of the motivator-hygiene factors according to Padilla-Velez (1993, pp. 20-21) and Bowen (1980, pp. 13-14).

> Recognition- Acts of notice, praise, or blame supplied by one or more superiors, peers, colleagues, management persons, clients, and/or the general public.
>
> Achievement- Accomplishment of endeavors including instances wherein failures were incurred. Similarly, instances were included wherein neither success or failures were incurred.
>
> Possibility of Growth- Whether a change in status was possible irrespective of the fact that the change could be upward or downward in status.
>
> Advancement- Designated an actual change in job status.
>
> Salary- All sequences of events in which compensation plays a major role.
>
> Interpersonal Relations- Relationships involving superiors, subordinates, and peers.
>
> Supervision- The supervisor's willingness or unwillingness to delegate responsibility and willingness to teach subordinates.
>
> Responsibility- Satisfaction derived from being given control of personal work or the work of others and/or new job responsibility.
>
> Company Policy and Administration- Events in which some or all aspects of the company were related to job satisfaction.
>
> Working Conditions- Physical working conditions, the facilities, and the quantity of work as related to job satisfaction.
>
> The Work Itself- The actual job performance related to job satisfaction.

Herzberg, Mausner, and Snyderman (1959) named the determinants of satisfaction "motivators" and the determinants of dissatisfaction "hygienes". Motivators facilitated high performance and effort while hygienes prevented dissatisfaction. While the motivator-hygiene theory was supported in educational settings (Padilla-Velez, 1993), a review of literature revealed criticisms (Moxley, 1977; Padilla-Velez, 1993; Poling, 1990; Steers & Porter, 1992) of the motivator-hygiene theory.

Steers and Porter (1992) submitted that the motivator-hygiene theory attempted to describe five different theoretical interpretations. Bowen (1980, p. 107) wrote that "Herzberg's Motivator-Hygiene Theory is not applicable to teacher educators in agriculture". Bowen (1980) added, "all ten factors were related to job satisfaction and the five hygiene factors explained a higher proportion of the job satisfaction score variance than the five satisfier factors". Padilla-Velez (1993), Bowen and Radhakrishna (1991), and Castillo, Conklin, and Cano (1999), who studied agricultural teachers, also reported positive relationships between job satisfaction and the

hygiene factors, which were purported by Herzberg et al., (1959) to have little affect upon positive job attitudes. The extent to which the motivator-hygiene theory, and other job satisfaction theories such as equity theory (Adams, 1965) and discrepancy theory (Lawler, 1973), contribute to the understanding of job satisfaction, is one of several issues in the abundance of research pertaining to job satisfaction.

Determining the type of measure which constituted a valid assessment of job satisfaction was yet another issue. The dimensions which were thought to contribute to overall job satisfaction have been contested. Brief (1998) maintained that there was a lack of theory which described the facets of satisfaction, much less theory which indicated the importance of one particular facet over another. Toward this end, measures to assess facet satisfaction (Wood, 1973; Smith, Kendall, & Hulin, 1969; Weiss, Dawis, Lofquist, & England, 1966) and overall job satisfaction (Brayfield-Roth, 1951) were developed.

Smith, Kendall, and Hulin, (1969) developed the "Job Description Index" which assessed satisfaction with coworkers, pay, promotion opportunities, supervision, and the work itself. A value is calculated for each facet based upon a respondents' reply on 9 to 18 adjectives for each facet (Brief, 1998). Weiss, Dawis, Lofquist, & England (1966) developed the Minnesota Satisfaction Questionnaire which assessed employees level of satisfaction with 20 aspects of their work. The aspects, according to Brief, were: ability, achievement, activity, advancement, authority, company policies and practices, compensation, coworkers, creativity, independence, moral values, recognition, responsibility, security, social service, social status, supervision-human relation, supervision-technical, variety, and working conditions. Subjects who respond to the Minnesota Satisfaction Questionnaire are asked to indicate their level of satisfaction using a five-point scale for each of the 100 items on the measure. Wood (1973) developed a measure to assess employee's level of satisfaction with each of the motivator-hygiene factors known as the Faculty Satisfaction/Dissatisfaction Scale. Bowen's (1980) version of Wood's Faculty Satisfaction/Dissatisfaction Scale contained 88 items and asked respondents employed as faculty members in higher education to respond to statements using a 6-item scale. Brief (1998) provided evidence that measuring the level of job satisfaction across facet scales was not equivalent to measuring overall job satisfaction.

Brayfield and Rothe (1951) developed the Job Satisfaction Index to measure overall job satisfaction when all aspects of their job were considered. The Job Satisfaction Index consists of 18 items with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Researchers seeking to measure overall job satisfaction in recent years have contested the use of multi-item scales (Scarpello & Campbell, 1983). Scarpello and Campbell (1983) (as cited in Brief, 1998) suggested their "one-item, five-point global rating of overall job satisfaction is reliable and inclusive, and that the whole, represented by this global measure, is more complex than the sum of the presently measured parts"(p. 15). There has been no attempt to validate a one-item measure of overall job satisfaction among faculty in the College of Food, Agriculture, and Environmental Sciences (CFAES) at The Ohio State University. Moreover, there has been no attempt to describe the variability in overall job satisfaction scores by a linear relationship of the motivator-hygiene factors.

Purpose and Objectives

The purpose of this study was to describe the amount of variance in CFAES faculty member's overall level of job satisfaction using Herzberg, Mausner, and Snyderman's (1959) job satisfying and dissatisfying factors. Additionally, this paper investigated the suitability of a one-item versus a multi-item measure of overall job satisfaction. The following research questions were formulated to guide the study.

1. What were the characteristics of faculty members in the College of FAES at The Ohio State University?

    1. What was the age, gender, total number of years in the present position, total number of years in higher education, of faculty in the CFAES?

    2. What was the overall level of job satisfaction among CFAES faculty?

    3. What was the CFAES faculty member's level of satisfaction with job satisfying (motivator) factors (achievement, advancement, recognition, responsibility, and the work itself)?

    4. What was the CFAES faculty member's level of satisfaction with job dissatisfying (hygiene) factors (pay, working conditions, supervision, company policy, and interpersonal relations)?

    5. What was the relationship between CFAES faculty demographic characteristics (age, tenure status, years in current position, total years in higher education) and overall job satisfaction?

    6. What was the relationship between the CFAES faculty member's overall level of satisfaction and job satisfying (motivator) and job dissatisfying (hygiene) factors?

    7. What was the relationship between the College of FAES faculty member's level of job satisfaction and job dissatisfying (hygiene) factors (pay, working conditions, supervision, company policy, and interpersonal relations)?

2. To what extent can variability in the CFAES faculty member's overall level of job satisfaction be explained by their current level of satisfaction with the job satisfying and dissatisfying factors?

3. What is the relationship between the Job Satisfaction Index (Brayfield & Rothe, 1951) and a one-item measure regarding overall job satisfaction?

Procedures

Population and Data Collection

A census for this study was conducted among faculty at the College of Food, Agricultural, and Environmental Sciences at The Ohio State University in the Spring of 1999. A frame was established from a current list of faculty in the College. The study was limited to faculty on main campus in Columbus, Ohio. There were a total of 172 faculty members in the population.

Two weeks prior to the first mailing, a pre-letter was sent to inform faculty of the forthcoming study. A packet containing an instrument and cover letter describing the purpose of the study were hand delivered to each faculty member in the respective departments. Ten days following the first mailing a reminder postcard was sent to each participant. Two weeks following the first mailing, a second mailing containing the instrument and a revised cover letter was sent to all non-respondents. A third complete mailing was sent two weeks after the second mailing.

A total of 148 faculty members returned questionnaires yielding an overall response rate of 86%. The number of usable responses for determining overall job satisfaction, Part I, was 83%. For part II of the instrument, 48% data was considered usable as faculty members failed to answer all of the items pertaining to the motivator-hygiene factors. The number of usable responses for determining demographics variables was 80%.

Instrumentation

The questionnaire consisted of three parts: the Job Satisfaction Index, Wood's (1973) Faculty Satisfaction/Dissatisfaction Scale, and demographic questions. Part I of the instrument contained the Job Satisfaction Index. The Job Satisfaction Index considered all facets of the job when measuring job satisfaction, utilizing an 18-item five-point Likert type scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree).

Part II of the questionnaire consisted of Wood's (1973) Faculty Satisfaction/Dissatisfaction Scale, as modified by the researcher, to measure the Herzberg et al., motivator-hygiene factors. Wood's instrument consisted of a 79-item six-point Likert type scale with responses varying from 1 (very dissatisfied) to 6 (very satisfied). The faculty members' perceptions of the motivator-hygiene factors: achievement, advancement, recognition, responsibility, the work itself, supervision, salary, interpersonal relationships, policy and administration, and working conditions were measured by Wood's (1973) instrument in Part II. Part II also contained a one-item overall job satisfaction measure which read, "Considering all aspects of my job, my overall level of job satisfaction is..." Part III of the questionnaire consisted of questions pertaining to the demographic characteristics of the respondents.

Content validity was established by a panel of experts consisting of teacher educators, College administrators, and graduate students. Each of the experts on the panel were asked to examine the instrument based on content, clarity, wording, length, format, and overall appearance. Cronbach's alpha was used to assess instrument reliability. The reliability coefficient for Part I of the questionnaire was .89. The reliability coefficient for Part II of the questionnaire was .96,

while the coefficients for the ten sub-scales of Part II were: achievement, .81; advancement, .89; relations, .91; policy/administration, .93; recognition, .88; responsibility, .88; salary, .92; supervision, .97; work itself, .83; and working conditions, .82. The one-item overall job satisfaction measure was not included when establishing a reliability coefficient for the 79 items in Part II.

Data Analysis

The data was analyzed using the Statistical Package for the Social Sciences, Personal Computer version (SPSS/PC+). Correlation coefficients were interpreted using Davis' (1971) descriptors. Appropriate descriptive statistics were calculated.

Results/Findings

Respondents consisted of 12% (n=17) female and 88% (n=122) male faculty. Most of the faculty 96% (n=142) had attained a doctorate degree. The mean age for faculty was 49 (n=132) (Table 1). The mean number of years faculty had been in their current position was 15.0, while the mean number of years they had been in higher education was 18.0. Eighty percent (n=110) of the faculty were tenured, while 20% (n=29) indicated that they had not received tenure. The mean age for females (n=15) was 42. Females (n=15) had been in their current position for 8 years and in higher education a total of 9 years. The mean age for males (n=118) was 50. Males (n=118) had been in their current position for 15 years and in higher education a total of 19 years.

Table 1. Means and Standard Deviations for Selected Demographic Variables

Variable	All Faculty		Female		Male	
	Mean	SD	Mean	SD	Mean	SD
Age	49.0	8.82	42.0	6.9	50.0	8.75
Years in Current Position	15.0	10.00	8.00	5.54	15.0	9.42
Years in Higher Education	18.0	9.31	9.00	5.50	19.0	5.94

Based on a five point Likert type scale with responses ranging from strongly disagree (1) to strongly agree (5), the overall level of job satisfaction was 4.02 (n=142) (Table 2). The overall level of satisfaction for females (n=17) was 3.78 and 4.06 for males (n=119).

Table 2. Means and Standard Deviations for Overall Job Satisfaction

Variable	All Faculty		Female		Male	
	Mean	SD	Mean	SD	Mean	SD
Overall Job Satisfaction	4.02	.53	3.78	.57	4.06	.50

Based on a six point Likert type scale with responses ranging from very dissatisfied (1) to very satisfied (6), faculty members provided the following mean satisfaction scores with the job

satisfier and dissatisfier factors: achievement, 4.49; advancement, 3.93; recognition, 4.26; responsibility, 4.43; work itself, 4.87; interpersonal relations, 4.31; policy and administration, 3.84; salary, 3.74; supervision, 4.08; and working conditions, 3.50.

Table 3. Means and Standard Deviations for Job Satisfier and Job Dissatisfier Factors.

Variable	Mean	SD		Mean	SD
Job Satisfiers			Job Dissatisfiers		
Achievement	4.49	.66	Relationships	4.31	.88
Advancement	3.93	.98	Policy	3.84	1.00
Recognition	4.26	1.00	Salary	3.74	1.10
Responsibility	4.43	.94	Supervision	4.08	1.23
Work Itself	4.87	.66	Work Conditions	3.50	.98

Correlations were calculated to describe the relationships between faculty member's overall level of job satisfaction and selected demographic variables. The coefficients were negligible (Davis, 1971) and were as follows: age, r=.05; years in current position, r=.02; years in higher education, r=.10; and tenure status, r=.09.

Correlations were calculated to describe the relationships between CFAES faculty member's overall level of job satisfaction and the job satisfying (motivator) and dissatisfying (hygiene) factors (Table 4). Correlation coefficients ranged between moderate to substantial (Davis, 1971) and were as follows: advancement, r= .45; achievement, r=.53; recognition, r=.45; responsibility, r=49; and the work itself, r=.42; working conditions, r=.38; salary, r=.40; supervision, r=.50; policy and administration, r=.53; salary, r=.40; and interpersonal relations, r=.44.

Table 4. Relationships Between Overall Job Satisfaction and Selected Job Factors.

Variable	r	Variable	r
Job Satisfiers		Job Dissatisfiers	
Achievement	.53	Relationships	.44
Advancement	.44	Policy	.53
Recognition	.44	Salary	.40
Responsibility	.47	Supervision	.50
The Work Itself	.42	Working Conditions	.38

Stepwise multiple regression analysis was used to describe the amount of variability among CFAES faculty members overall level by a linear combination of the job satisfying and dissatisfying factors. The suitability of the data for multiple regression analysis assessed by investigating the relationship among the job satisfying/dissatisfying factors (independent variables) and the over all level of job satisfaction among the faculty (Table 5) and by plotting the residuals. The correlation matrix was consulted to investigate collinearity. Collinearity among the independent variables was not a problem. The correlations between the motivator-hygiene factors and overall job satisfaction were moderate to substantial (Davis, 1971). The residuals were plotted and all of the assumptions regarding the residuals were met. Therefore, it was determined that the data were suitable for multiple regression analysis. However, based upon the negligible relationships (Davis, 1971) between overall job satisfaction levels and selected demographic characteristics, the researchers chose not to include demographic characteristics in the regression analysis.

The multiple regression analysis revealed that recognition accounted for 43% of the variance in the level of overall job satisfaction. When supervision was added to the regression equation 52% of the variance in overall job satisfaction could be accounted for. Lastly, when interpersonal relationships were added 58% of the variance in overall job satisfaction scores was accounted for (Table 6).

To determine the validity of the single-item measure of overall job satisfaction the mean scores on the Brayfield and Rothe (1951) Job Satisfaction Index and the single-item measure were standardized and compared. There was no difference among the standardized scores. Secondly, the standardized scores were very strongly correlated (r=.73).

Table 5. Intercorrelations Among Independent Variables and Overall Job Satisfaction.

	Intercorrelations										
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00	.473	.529	.596	.480	.440	.434	.334	.422	.357	.441
X_2		1.00	.681	.611	.510	.503	.661	.654	.545	.450	.489
X_3			1.00	.595	.467	.613	.670	.713	.637	.345	.504
X_4				1.00	.432	.510	.638	.535	.621	.519	.477
X_5					1.00	.454	.449	.411	.303	.295	.440
X_6						1.00	.570	.502	.489	.306	.512
X_7							1.00	.686	.757	.537	.470
X_8								1.00	.614	.520	.416
X_9									1.00	.458	.408
X_{10}										1.00	.292

Note: X_1=Achievement, X_2=Advancement, X_3=Recogntion, X_4=Responsibility, X_5=Work Itself, X_6=Relationships, X_7=Policy and Administration, X_8=Salary, X_9=supervision, X_{10}=Working Conditions, X_{11}=Overall Job Satisfaction.

Table 6. Regression of Overall Job Satisfaction on Selected Independent Variables. (Stepwise Entry)

Variable	R^2	R^2 Change	b	t
Recognition	.43	.43	.25	3.10
Supervision	.52	.09	.34	4.61
Relationships	.58	.06	.31	4.32
Constant			1.03	

Conclusions/Recommendations

Faculty membership in the College of Food, Agricultural, and Environmental Sciences at The Ohio State University is a male dominated profession. This is evidenced in the results of the study which revealed that male faculty were older, had more years of experience in their current position, and had more years of experience in higher education than their female counterparts. Efforts to increase gender diversity among faculty should continue.

Faculty in the College of Food, Agricultural, and Environmental Sciences were generally satisfied with their jobs. However, female faculty members were less satisfied than male faculty in the current study. This conclusion implies that there may be some systems in place which fail to take into consideration the perceptions of female faculty members. Focusing on the motivator-hygiene factors, Administrators should use the results of this study to investigate particular systems for gender equity.

The factor work itself was the most satisfying aspect of faculty in the current study. The least satisfying aspect of faculty member's jobs were the working conditions. These findings imply that faculty were most satisfied with the content of their job and least satisfied with the context in which their job was carried out. Individual department administrators should conduct job analysis for each position and seek innovative ways to enhance what faculty members actually do. Conversely, the environment in which faculty members work is carried out should be reviewed to improve the context. This was evidenced in the comments portion of the instrument where particularly female respondents indicated that they wanted to participate in the study but were concerned with their perceptions being made public.

The demographic characteristics of faculty members were negligibly related to overall job satisfaction. This discovery implies that based upon age, gender, years in current position, total years in higher education, and tenure status that faculty are stable with regard to their overall level of job satisfaction. Nonetheless, demographic characteristics facilitated the discovery of differences in overall job satisfaction by gender and described the age of faculty members. In future studies of job satisfaction, demographic characteristics should not be collected via questionnaire if they are available from college administrators.

All of the job satisfying and dissatisfying characteristics were moderately or substantially related to overall job satisfaction. Unfortunately, this conclusion implies that the basic tenants of the motivation-hygiene theory do not hold true for faculty in the CFAES. In this regard, factor analysis should be employed on the motivation-hygiene factors to derive a more parsimonious set of factors which serve as independent variables in facet-satisfaction investigations. Moreover, a lesser amount of items on a measure would ultimately decrease non-response error and increase the percentage of usable responses.

Intercorrelations between the job satisfying and dissatisfying factors indicated that collinearity was not a problem when the factors were entered into a regression equation model. Moreover, there was a linear relationship (low to substantial) (Davis, 1971) among the job satisfying factors and overall job satisfaction. Stepwise multiple regression analysis revealed that the factors recognition, supervision, and relationships explained the variability among faculty member's

overall job satisfaction scores. This discovery implies that to elevate the collective overall level of job satisfaction among faculty members, college administrators should focus on improving the recognition, supervision, and interpersonal relationship aspects of their job. With regard to recognition, college administrators should evaluate the reward system in light of the many contemporary changes taking place in higher education to determine if current reward systems are meeting the needs of faculty members. To enhance the context in which faculty member's are supervised, funds should be sought and secured to provide leadership development for department chairs such as at the new Executive Development Center at Ohio State university. Lastly, to enhance interpersonal relations department Chairs should convene along with College administrators to attempt to remove the barriers between inter and intra-departmental relationships.

The one-item measure of overall job satisfaction was not different from the Brayfield and Rothe (1951) Job Satisfaction Index. Additionally, the two measures were very strongly related (Davis, 1971). This research finding implies that the single-item measure should be adopted and used in studies of overall job satisfaction among higher education faculty. Wanous, Reichers, and Hudy (1997) wrote that "There may also be practical limitations favoring the use of a single-item measure" (p. 14). Wanous et al., identified space on an instrument, cost, and face validity as examples of practical limitations which supported the use of single-item measures.

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Factors Explaining Job Satisfaction Among Faculty in the College of Food, Agriculture, and Environmental Sciences at The Ohio State University

A Critique

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The literature review presented in this paper supports the conclusion that so much has been written about job satisfaction theories, constructs, and data, but we still know so very little about it at the specific job site. Could it be that in general the theories are interesting and make sense but in specific cases the theories remain interesting but make no sense? Humans being what they are bring more to the job than what often can be properly analyzed. This fact frustrates but does not stop people who study job satisfaction. Thus, we have another study on job satisfaction that attempts to analyze job satisfaction of faculty in a college of food, agriculture and environmental science. This is a tough study to conduct, since it has been shown that it is difficult to satisfy university faculty. Nonetheless, the researchers gave it a good shot.

The extensive literature review/theoretical frame for this study was well documented and clearly stated. The procedures followed in the study appeared to be appropriate and were presented in an understandable format. The response rate and useable questionnaires or portions thereof seemed to be a bit unclear and should be clarified. There was a thorough analysis of the data to the point that the analysis may have been slightly overdone. I am convinced there is only so much analysis that needs to be done on a set of data, beyond which we exhaust the utility of the data. Nonetheless, this study indicated some interesting if small relationships among variables.

There are a few questions that this study presents that require some explanation:

- What new information have we learned that we didn't already know? Link data back to the literature.
- What are the implications to practice in Agricultural Education in particular?
- What specific role does agricultural education have to promote job satisfaction in colleges of agriculture?
- Are the basic tenets of the motivation-hygiene theory really appropriate in today's job world?
- What have we learned from this study that we would change in future job satisfaction studies?
- Where is this research headed?

This reviewer was left hanging at the end of the paper. It would really be helpful to have a section of the paper that gave some hints to help us use what was presented. It appears we continue to study the same context with topics of this nature. What is the next level?

Motivation and Recognition Preferences of 4-H Volunteers

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Introduction

Imagine focusing 4.5 million hours of service annually on a common national initiative. The potential of this volume of service impacting change is almost staggering. According to statistics prepared by the Implications of Volunteerism in Extension project (IVE, 1984), 4-H volunteers commit 4.5 million hours annually to 4-H members. In Nebraska alone, 17,000 4-H volunteers served approximately 122,000 youth ages 5-19 in a variety of educational settings. These Nebraska youth are members of 28,000 organized 4-H clubs throughout the state (Nebraska State 4-H Office, 1999).

Who are these volunteers? Does 4-H attract volunteers who have a common reason or motivation for volunteering? What kinds of recognition do these volunteers appreciate for their service?

4-H volunteers are a key component of the 4-H program. Research by Snider (1985) concluded that a team of committed, trained volunteers and extension professionals has more impact on leadership, service, and delivery of programs than the agent who doesn't share ownership and responsibility with trusted volunteers. In counties where volunteers assume leadership in the 4-H program the following results: (1) a stronger 4-H program, (2) clearer understanding of 4-H goals, (3) more volunteer ownership, (4) greater program diversity, and (5) increased support for 4-H (Snider, 1985). Snider believes strong volunteer leader involvement will strengthen the 4-H program around the world. Consequently, local program quality is, to a great extent, a reflection of the involvement of organizational and project volunteers.

Given the crucial role of volunteers in 4-H, 4-H programming must address the development (e.g. recruitment and retention) of volunteer resources. A key component of this development is awareness of the primary motivation of volunteers and effective means of recognizing them (O'Connell, 1976; Penrod, 1991).

Motivation

Motivation has been an emphasis in behavioral research throughout the past fifty years. Motivation has been examined extensively using several taxonomies of motivation (Alderfer, 1968; Barbuto & Scholl, 1998; Maslow, 1943; McClelland, 1961). One of the most widely used in research and practice is McClelland's trichotomy of needs. The theory proposes that individuals are motivated by one of three sources: achievement, affiliation, and power (McClelland, 1961). Achievement is described as working toward something only to achieve a goal or dream. Achievement is trying to accomplish something with great effort, skill or perseverance. Affiliation is described as establishing, maintaining, or restoring a positive affective relationship with another person. This relationship is described mostly by the word "friendship." Other statements associated with affiliation are "liking," or "the desire to be liked" or "accepted by someone." Approval-seeking is a high priority of a person motivated by affiliation. Power is described as the control or influence on a person (Yukl, 1998).

Atkinson (1977) extended the inquiry that McClelland initiated regarding the trichotomy of needs. McClelland and Atkinson suggested that "people behave as they do because they believe their behavior will lead to a desired reward or goal" (Hampton, et. al., 1982). The trichotomy of needs is based on the proposition that people make choices about volunteering according to their goals or needs and whether the volunteering will lead to the goals (Henderson, 1981).

4-H Volunteerism

Reasons for 4-H volunteerism have been studied over the years by several researchers. Some of the earliest research was completed by Brown and Boyle (1964), which identified 4-H volunteers' own children as their primary motivation to volunteer. Later, ACTION (1974) and Parrot (1977) both concluded volunteers' desire to help people, their sense of duty, and their enjoyment of the experience were most frequently cited motivators.

Henderson (1981) studied 200 adult 4-H volunteers (club leaders, project leaders, activity leaders, committee members and other leaders) and found that the primary reasons for volunteerism were (1) opportunities to be with their own children, (2) desire to help others, and (3) a desire to associate with youth. Also, affiliative outcomes were reported as being most motivating. The least motivating reasons were (1) perceptions that participation might lead to employment, (2) that volunteering would provide an opportunity to influence others, and (3) that volunteering might bring recognition. Reasons for participation that were highest ranked were seen as priority issues for paid staff to consider. Henderson recommended that attempts be made to help volunteers to gain what they want from their volunteer experience.

A more recent study (Rouse & Clawson, 1992) of volunteers 50 years of age or older, measuring the McClelland's trichotomy of needs using the instrument developed by Henderson (1981), determined that older adults were predominantly motivated by achievement and affiliation rather than by power. Although the study of Smith and Bigler (1985) was not linked to motivation theory as that of Henderson's (1981), their study of Ohio 4-H volunteers concluded the strongest

motivating force for volunteers to become 4-H leaders was having been asked to volunteer by a current 4-H leader.

Recognition

Once 4-H volunteers are recruited, what are their preferred means of recognition for their service? Recognition is a key consideration in step four (perpetuating) of a structured means of guiding volunteers (L-O-O-P) developed by Penrod (1991). Attention to recognition of volunteers can be the difference between retaining or not retaining volunteers. For instance, in a study of Ohio continuing and discontinuing 4-H volunteers conducted by Smith and Bigler (1985), continuing volunteers reported higher incidents of tangible recognition, and they had more frequent attendance at recognition programs than discontinuing volunteers.

A recent study of Ohio 4-H volunteers who were attending a 4-H recognition luncheon found that "receiving plaques, certificates, pins, etc." and "recognition banquet or luncheon" were the most frequently cited county-based components of volunteer recognition (Culp & Schwartz, 1999). The study also concluded the most meaningful source of recognition was 4-H members, and the most frequently cited meaningful types of recognition were a thank you note from the extension agent and a thank you note from a 4-H'er. However, a thank you note from a 4-H'er, while much lower in frequency rank, was highest by mean score.

Purpose and Objectives

Penrod (1991) argued that the volunteer recognition process is most meaningful when it is linked to volunteers' motivational patterns. To date, this linkage between meaningful forms of volunteer recognition and volunteer motives has not been made.

This study examined the motives of 4-H volunteers and identified strategies for recognition by:

1) classifying demographics of respondents;
2) identifying preferred forms of recognition;
3) analyzing primary motivation of volunteers using statements and subscales based upon McClelland's trichotomy (achievement, affiliation, power) of needs; and
4) exploring the relationship between primary motivation of 4-H volunteers and most preferred forms of recognition.

Procedures

Sample

The population for this study was defined as all Nebraska 4-H organizational and project leaders. Addresses for the 737 organizational and 1,242 project leaders were secured from the Nebraska State 4-H Office in the spring of 1999. Using a stratified, random sampling strategy (i.e., percentage of organizational and project leader, and region), 264 organizational and 450 project leaders (n=714) were sampled across the five regions of the state.

Procedures and Instrumentation

Preferred forms of recognition were measured using 19 demographic and attitudinal items from an instrument developed by Culp and Schwartz (1999). The 19 items featured a mix of Likert-type scales (5=very important, 1=very unimportant), rank ordering and frequency counts. Motivation was measured using 27 statements (based on McClelland's trichotomy of needs theory, 1961) which featured Likert-type scales (7=Agree, 4=Neutral, 1=Disagree) developed by Henderson (1981). (The 27 statements were later collapsed into the three primary motivation subscales of achievement, affiliation and power.) The instrument was reviewed by a panel of University of Nebraska Extension faculty and graduate students to insure validity.

Two weeks after the first mailing of a cover letter, coded instrument, and return, postage-paid envelope, 210 respondents had returned instruments. Two weeks after receiving a postcard reminder, 92 additional respondents had returned instruments. Using the recommended procedure for nonrespondent follow-up of Miller and Smith (1983), a random sample (100) of non-respondents was sent instruments and return, postage-paid envelopes. This procedure yielded 28 more responses. In total 330 instruments were received with a return rate of 46%. First, second and third respondent groups were compared, and no significant differences were found among their demographic, rank ordering or attitudinal responses. The Cronbach alpha for the motivation items was .89, and motivation subscale Cronbach alphas ranged from .82 to .88.

Analysis of Data

The data were analyzed using SAS. Descriptive statistics, collapsing of items into subscales, as well as Chi-Square (e.g. Kruska-Wallis and Wilcoxon tests) comparisons.

Results

The average age of the respondents was 43 (see Table 1). They had an average of 2.88 children, with 1.94 children ranging from ages 9 to 19. A vast majority of the respondents (318 of the 330) reported 2.5 of the children are or have been 4-H members. This finding is similar to Whaples and Bordelon (1983) study in which over 90% of the responding 4-H volunteers had children in 4-H. Annually, the respondents spend an average of 57 hours as a 4-H volunteer, dramatically less compared to the average of 200 hours reported by volunteers in a 1970 study by Banning. 4-H volunteers also were affiliated with an average of three other volunteer organizations. Seventy percent of the respondents had been 4-H members, with an average of 7.4 years of involvement. Banning's (1970) study found that only slightly more than 50% of the respondents had been 4-H members.

The majority (38.5%) of the respondents' highest level of educational attainment was a high school diploma, while 10.5% had associate degrees, and 27.7% had bachelors' degrees. All respondents had at or above a high school education; in the study of Smith and Bigler (1985) 90% of the responding 4-H volunteers were high school graduates and above.

Table 1. 4-H Volunteer Status and Age of Respondents.

	Age					
Leader status	15-29	30-39	40-49	50-59	60+	Total
Organizational	6(2%)	33(10%)	73(22%)	15(4.5%)	5 (1.5%)	132(40%)
Project	17(6%)	46(14%)	96(29%)	26(8%)	11(3%)	196(60%)
Total	23(8%)	79(24%)	169(51%)	41(12.5%)	16(4.5%)	328*(100%)

Note. Two respondents did not identify their age.

Both the most frequently cited and highest mean rank of the most appealing form of 4-H leader recognition was "letter from 4-H members (see Table 2)." Second in frequency, but third in mean rank, was a "phone call from 4-H members." Third in frequency, but 13th in mean rank, was "coverage in the newspaper." The least appealing forms of leader recognition by mean rank and frequency were "visit from the extension educator," "recognition at the State Fair or Roundup," and "phone call from the extension educator."

Table 2. Most Appealing Forms of Leader Recognition.

Form of recognition	Mean Rank	M	SD	n	Freq rank
Letter from 4-H members	1	2.16	1.36	173	1
Visit from 4-H members	2	2.41	1.35	93	8
Phone call from 4-H members	3	2.46	1.34	128	2
Receiving plaques, certificates, pins	4	2.68	1.39	111	5
Formal recognition banquets	5	2.75	1.69	71	13
Visit from parents	6	2.79	1.28	72	12
At your club's annual Achievement Program	7	2.83	1.52	89	9
At a ceremony held during the county fair	8	2.95	1.27	80	10
Phone call from parents	9	2.98	1.25	97	7
Letter from the Extension Educator	10	3.01	1.41	112	4
Letter from parents	11	3.05	1.24	107	6
Information recognition (at a meeting)	12	3.10	1.49	78	11
Coverage in the newspaper	13	3.16	1.45	116	3
Visit from the Extension Educator	14	3.17	1.54	29	16
Recognition at the State Fair or Roundup	15	3.20	1.35	35	15
Phone call from the Extension Educator	16	3.39	1.39	51	14

Note. Respondents asked to identify top 5 and ranking 1=most appealing, 2=second most appealing

Two motivation attitudinal statements tied for highest mean score, "I am a 4-H volunteer because I like helping people," and "I am a 4-H volunteer because I like associating with youth (see Table 3)." The statement "I am a 4-H volunteer because I want to be with my child(ren) in the 4-H

program" was the third highest rated statement. All three statements were in the affiliation subscale category.

The three lowest rated attitudinal statements were "I am a 4-H volunteer in order to gain experience and skills which might lead to employment," "I am a 4-H volunteer because I like to receive recognition for being a volunteer," and "I am a 4-H volunteer because I can't say 'no' when I'm asked." These three statements were in the subscale categories of achievement, power, and affiliation, respectively.

After collapsing the attitudinal statements into subscales, the results indicated that respondents were primarily motivated by affiliation, followed by achievement and power. This result mirrors the findings of Henderson's (1981) study of Minnesota 4-H volunteers.

No significant (.05) relationships were found among respondents' motivation subscale means and their most appealing forms of recognition. This finding was not expected for it was anticipated that a 4-H volunteers' motives would predict their preferred forms of reward (Penrod, 1991).

Table 3. 4-H Volunteer Responses to Motivation Attitudinal Statement and Subscale Frequencies, Means and Standard Deviations

Subscales and attitudinal statements	n=330	Disagree 1-3	Neutral 4	Agree 5-7	M	SD
Affiliation Subscale					**5.19**	**0.78**
I am a 4-H volunteer because I want to be with my child(ren) in the 4-H program.		27(8.2%)	27(7.6%)	278(84.2%)	6.14	1.47
I am a 4-H volunteer because I like helping people		5(1.5%)	17(5.2%)	308(93.3%)	6.15	1.02
I am a 4-H volunteer because I like associating with youth.		10(3.1%)	13(3.9%)	307(93%)	6.15	1.03
I am a 4-H Volunteer because it is a way I can express my caring and concern for others.		12(3.6%)	46(13.9%)	272(82.5%)	5.63	1.17
Volunteering in 4-H gives me a chance to meet other volunteers.		36(10.9%)	89(27%)	205(62.1%)	4.99	1.37
As a 4-H volunteer, I prefer to work with groups of people rather than alone.		49(14.8%)	99(30%)	182(55.2%)	4.76	1.57
I am a 4-H volunteer because I feel needed in the program.		39(11.8%)	62(18.8%)	229(69.4%)	5.14	1.47
As a 4-H volunteer, it is important to me that people like me.		77(23.3%)	88(26.7%)	165(50%)	4.45	1.69
I am a 4-H volunteer because I can't say "no" when I'm asked.		168(50.9%)	71(21.5%)	91(27.6%)	3.24	1.88
Power Subscale					**4.59**	**0.09**
I am a volunteer because I want to have influence on how young people learn and grow.		9(2.7%)	19(5.8%)	302(91.5%)	6.12	1.09
I am 4-H volunteer because I want to teach and lead others.		12(3.6%)	44(13.3%)	274(83.1%)	5.62	1.21
I like being involved in the leadership of the 4-H program.		13(3.9%)	59(17.9%)	258(78.2%)	5.54	1.21
I am a 4-H volunteer because I like to be involved in making decisions and program planning.		60(18.2%)	95(28.8%)	175(53%)	4.73	1.50
As a 4-H volunteer, I enjoy being able to "do my own thing."		67(20.3%)	91(27.6%)	172(52.1%)	4.63	1.53
I volunteer in 4-H because I like to be responsible for 4-H programs.		66(20%)	117(35.5%)	147(44.5%)	4.39	1.42
I receive status in my community because I am a 4-H volunteer.		143(43.3%)	112(33.9%)	75(22.7%	3.49	1.69
I am a 4-H volunteer because I like to receive recognition for being a volunteer.		177(53.6%)	110(33.3%)	43(13.1%)	2.97	1.58

I am a 4-H volunteer because I want to have influence over others.	134(40.6%)	85(25.8%)	111(33.6%)	3.69	1.84
Achievement Subscale				**4.85**	**0.85**
I volunteer in 4-H because it is a way to improve my community.	12(3.6%)	39(11.8%)	279(84.6%)	5.78	1.22
I am a 4-H volunteer because I want to learn new things.	10(3.1%)	47(14.2%)	273(82.7%)	5.64	1.19
I am a 4-H volunteer because I like the challenge of the task.	24(7.3%)	83(25.2%)	223(67.5%)	5.15	1.34
As a 4-H volunteer, I have goals for what I want to accomplish as a volunteer.	30(9.1%)	87(26.4%)	213(64.6%)	5.09	1.30
I am a 4-H volunteer because it is a constructive use of my leisure time.	71(21.5%)	85(25.8%)	174(52.7%)	4.57	1.64
As a volunteer, I like to receive feedback from Extension staff, parents, and 4-H members about how I am doing.	38(11.5%)	79(23.9%)	2213(64.5%)	5.07	1.50
I am a 4-H volunteer because it is a task I can do well.	32(9.7%)	104(31.5%)	194(58.8%)	4.95	1.29
I am a 4-H volunteer because I feel an obligation to 4-H because of what it has done for me.	91(27.6%)	82(24.8%)	157(47.6%)	4.42	1.89
I am a 4-H volunteer in order to gain experience and skills which might lead to employment.	199(60.3%)	73(22.1%)	58(17.6%)	2.86	1.85

Note. Likert-type scale 1=Disagree, 4=Neutral, 7=Agree

Conclusions and Recommendations

Individuals who are approaching middle age are most likely to volunteer. They have been involved with 4-H, on the average, for a large portion of their eligible member years. They generally have a personal stake in the success or failure of the 4-H club for which they volunteer because they have or have had children involved in 4-H. Therefore, recruitment efforts need to be focused at parents of current 4-H members as well as 4-H alumni. Further research should be conducted to determine if the percentage of volunteers who have not been 4-H members has dropped in other states and nationally, with emphasis on determining if those who have not had the 4-H experience differ in their motives for volunteering.

The lack of relationship among the respondents' motivational subscale means and their most appealing forms of recognition may be explained by the general reputation-based forms of recognition described, seemingly affiliative in nature. Since all forms of recognition represented in the Culp and Schwartz (1999) instrument tap into a volunteer's need for affiliation, a volunteer's relative strength of the three needs (achievement, affiliation and power) would have little bearing on which methods were preferred.

While a majority of the 4-H volunteers have some exposure to post-secondary education, the largest percentage have a high school education. Therefore, assumptions regarding background in college-level sciences, math, etc. that could be made in volunteer training by extension educators should be avoided.

While perhaps not a valid comparison (state to national study results), it is certainly noteworthy that the average 4-H volunteer leader in this study was committing almost 75% less time than the 4-H volunteer leader of 1970. In thirty years, volunteers may be committing more of their discretionary time to other organizations rather than 4-H, perhaps 4-H is not asking as much of today's volunteers, or perhaps volunteers are reluctant to give up their personal time. This question of service commitment has implications for expectations of 4-H volunteer leaders and their expectations of involvement, and bears exploring through a replication of Banning's (1970) national study.

In Nebraska, 4-H volunteers want personal recognition given by 4-H members, and efforts should be made to insure that this personal recognition occurs. Therefore, a critical component of projects popular with young 4-H members should include exposure to options for recognition of those who make the members' participation possible (volunteer leaders, extension educators, parents, siblings).

Two forms of recognition associated with direct communication by extension educators (i.e., visit and phone call) were among the least appealing to respondents. Volunteers may not identify 4-H as the youth component of a larger Extension program, and, therefore, do not connect their 4-H service with the efforts led by extension educators. Consequently, they would not value the recognition they would receive from the extension educator. Extension educators should be encouraged to focus on establishing the linkage between the 4-H program and the remainder of the extension program, and on building stronger relationships with volunteers.

The forms of recognition (Culp & Schwartz, 1999) used by extension educators are predominately affiliative, and while they will appeal to most volunteers, some volunteers may not feel adequately recognized. This inadequacy could lead to volunteers discontinuing their service. A broader range of recognition strategies should be identified for extension educators to incorporate into their volunteer program. A comparison of continuing and discontinuing volunteers' attitudes toward the recognition they received and differences in ranking and attitude toward recognition would address this issue.

A vast majority of respondents agreed that they were 4-H leaders for the purpose of learning new things. 4-H leaders would be an excellent market for extension education. Linking the training to ways 4-H volunteers could enhance member learning would be particularly advantageous.

4-H volunteers are members of several other organizations. Extension educators should be encouraged to explore ways to capitalize on volunteers' networks beyond Extension. These networks could be a valuable, community-based means of strengthening 4-H clubs through local multi-organization initiatives and general program awareness.

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Motivational and Recognition Preferences of 4-H Volunteers

A Critique

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Volunteers are an essential component in delivering 4-H programs to young people. If Extension educators are to improve the design and delivery of 4-H programs, it is essential that they have a sound knowledge base regarding the characteristics, motivation, and recognition of these volunteers. Current information on this topic is limited and the paper only cited 23 papers conducted since 1990. The results are important to the individuals concerned with and responsible for the Nebraska 4-H program. However, the findings also are relevant to others concerned with 4-H and other youth programming involving the use volunteers. The authors of this paper are to be commended for conducting and reporting this study.

The information reported by this study raised several questions regarding other research that could be conducted. For instance, what do disciplines such as psychology and sociology have to say about volunteering? What could we learn from and with interdisciplinary studies involving individuals with similar interests in volunteers? Since 4-H volunteer leaders are contributing 75 percent less time than they did in 1970, how much time a week do individuals have to contribute to organizations? What proportion of volunteers' available time are 4-H programs currently using? What are the characteristics, motivation and recognition of people who do not volunteer? Are volunteers different from people who do not volunteer? Are there other factors of volunteers that need to be addressed?

It was difficult to determine how the reliability of the instrument was established. Although the internal consistency coefficients were high, were these established prior to collecting the data or ex post facto? Although the researchers contacted nonrespondents, they only have information from those who volunteered to provide information (28 of 100). Would the responses have been the same if 28 individuals had been randomly selected and intensive efforts used to collect information from that group?

In reporting this study, it would have been helpful for concerned readers to have seen more specific information about the characteristics of the volunteers in table form. Readers had to rely on how the authors summarized the volunteer characteristics in written form rather than seeing the actual data. This paper reported means and standard deviations for information related to ordinal data in Table 3. A more appropriate reporting format would be to report frequencies and percents for each response category or groups of categories.

Enhancing a Study Abroad Experience Through the Internet

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Introduction and Theoretical Framework

With the far-reaching applications of distance education and the increasing costs of international travel well documented, can a vicarious student travel abroad system be far behind?

In a 1990 study published by the European Cultural Foundation, several academic effects of study abroad programs are listed. Among these were: tackling abstract problems, working with theories, articulating thoughts/views, cooperating with others, motivating other people, planning and following through, developing comparative perspectives (Opper, Teichler, and Carlson, 1990).

> *"I love new experiences and I feel that this trip to Costa Rica will provide me with the knowledge of differing aspects of agriculture and hopefully will increase my interest in agriculture even more"(student participant)*

Experiential learning, which has been shown to be an integral part of capstone programs (Andreasen, 1998), is equally integral to study abroad programs. Mortensen (1978) explains that experiential learning is conceptually linked to a great variety of activities that take place outside of the traditional classroom, chiefly, internships, independent study projects and study-abroad programs. Empire State College incorporated the experiential education and capstone concepts into their Principles of International Business Course. Students were provided the opportunity to participate in a study abroad program so that they could learn crucial international business concepts, skills, and other related learning which were unmet in the students other courses (Herdendorf, 1991). These related learning activities involved intense student-professor contact, student-student interactions, written and oral communications, and stimulating educational experiences.

> *"Education does a good job of stressing that first impressions are important, and lasting. It is not surprising then to recognize that many people hold false beliefs about others, especially those from other cultures. Unless we take the time to really get to know individuals who are different from us, we will be prone to believing false interpretations made during first impressions"(student participant)*

Plans for conducting a study abroad program to Costa Rica began in the fall of 1998. Students were informed of the opportunity to participate in an international agricultural education and production agriculture program. Twenty students enrolled in an experimental course, AgEd's 496x, at Iowa State University. With interest in experiential learning and capstone programs, certain decisions were made and the students informed about curriculum modifications that would increase the academic rigor and the reflectivity of the experience, reflection being one of the main tenets of experiential learning.

A small, internal grant was written to provide for development of an internet supported class website. The software package utilized was the WebCT courseware. WebCT is a software tool that facilitates the creation of sophisticated World Wide Web-based educational environments by non-technical users. It can be used to create an entire on-line course, publish materials related to an existing course, or as a communication supplement to an existing course. WebCT produces courses for the WWW and uses WWW browsers as the interface for the course-building environment. WebCT tools include a conferencing system, on-line chat, student progress tracking, group project organization, student self-evaluation, grade maintenance and distribution, access control, navigation tools, auto-marked quizzes, electronic mail, automatic index generation, course calendar, student homepages, course content searches and more.

The majority of these features were utilized in the construction and management of the experimental course. Students were guided through lessons on the use of the course web page as well as the agriculture, culture, climate, and education of Costa Rica. Simulations, as well as guided discussion were employed to facilitate an appreciation for and non-judgmental view of cultural and diversity issues.

> *"On a more serious note, I realized during today's class that my general thinking has been far from accurate. When a person mentions the term, developing country, I get a very distorted picture. I immediately picture a land of uneducated, bone weary workers...all must live at or near the poverty line. I think of individuals, not families. If I truly take time to think ... I feel more compassionate towards the individuals I plan to visit. Yes, I am concluding that Costa Rica is one sweet deal"(student participant)*

Purpose and Objectives

The purpose of this study was to assess the practicality of utilizing distance education media in enhancing a study abroad experience and to determine the level of acceptance of this media by student sojourners. This intent was triangulated through the incorporation of both qualitative and quantitative research methods, specifically the inclusion of anonymous student journal entries. The objectives of this study were to:

1. Identify elements of the study abroad course applicable to distance education technology.

2. Determine acceptance by participants to utilizing distance education technology during a study abroad experience.

Methods and Procedures

This study employed a qualitative research methodology, utilizing the researcher as observer. Further, this study utilized the qualitative evaluation model, *educational connoisseurship and criticism*, as developed by Elliot Eisner (1979). This research method was specifically designed for the purpose of educational evaluation. In this method the connoisseur (researcher) must have expert knowledge of the program being evaluated, as well as other similar programs (Borg & Gall, 1989).

In addition to the qualitative data of the study abroad experience such as selected insights, perceptions, and journal entries, which are included in the text of this paper, quantitative data in the form of student surveys are used to support the educational evaluation. The survey utilized was developed by the Agriculture Study Abroad Office at Iowa State University and consisted of ten sections asking the participant to reflect on their recent experiences both in country and in the classroom which impacted their study abroad experience. The responses from the sections dealing with the classroom instruction and the students' reflections about their in country experiences as well as demographic data were summarized and categorized. The journal entries appear within this paper as italicized quotes and are not attributed to a specific student, either through gender, class rank, or major. Quotes are reproduced as written in the student's journals without further editing from the author.

Results and Findings

Student perceptions were collected via an end-of-course summary survey completed by the participants as well as qualitative entries from the student's in-class and in-country journals. Twenty students registered for the course, eleven males and nine females, representing seven different majors and four different colleges. Participants varied in school rank from freshman to junior to senior status.

Selected demographical information from the course sojourners is presented in Table 1. The majority of the students listed Agricultural Studies (45%) as their major. Eighty-five percent of the participants were upper classmen (junior and senior status), while fifteen percent were freshmen.

Participants in this study attended a two-hour orientation class one day a week for the first ten weeks of the spring semester. During this time they engaged in a variety of activities designed to familiarize themselves with Costa Rican agriculture, their fellow sojourners, enhance their foreign language acquisition, and prepare them to articulate with a foreign culture. Infused in this orientation process was a weekly reflective exercise in which the students kept a learning journal describing their thoughts and feelings in relation to the content of the lessons, guest speaker presentations, peer bonding activities, and travel arrangements.

Table 1. Frequency and percentage distribution for selected demographic variables of course participants.

Item	Frequency	Percent
Gender		
Male	11	55
Female	9	45
Undergraduate major		
Agricultural Studies	9	45
Agricultural Education	4	20
Agricultural Business	3	15
Zoology	1	5
Chemical Engineering	1	5
Journalism	1	5
Transportation Logistics	1	5
Class status		
Freshman	3	15
Junior	9	45
Senior	8	40

> *"I thought that is was fun to be able to let our family have access to our class webpage. It was hard to learn how to use at first, but is was handy after we got used to using it" (student participant)*

The students then placed their journal entries into an electronic journal located within the course's travel abroad homepage. The homepage contained a variety of additional information from historical data about Costa Rica to a self-paced test on the culture, language, and agriculture. Additional links were provided to other country sites as well as a chat room option for posting messages among the students and instructor.

> *"My parents got to see who was going on the trip and a little background about each person. They enjoyed reading about the trip and looking at the pictures of when we were in country" (student participant)*

> *"I have really enjoyed looking at the webpage pictures and reading the daily in-country journals. My family and friends also have enjoyed looking at the webpage" (student participant)*

The incorporation of the webpage and its use for posting journal entries and other relevant class information immediately bore fruit. Students became excited about the possibility of family, friends and loved ones following their progress through the course and eventually into Costa Rica. One student went so far as to include the following in his journal "On a different note, I went home this past weekend and showed my parents how to use and track our progress over our class internet web page. They thought that this was really neat that they would be able to

observe parts of the trip that they are helping pay for. It is a shame that all study abroad trips don't have this incorporated into their plan at all."

> *"The webpage was very useful. My sister checked it everyday from the week before until the week after the trip. It made it easy to turn in the journals."(student participant)*

The next phase of this study was realized through the actual in-country experience. Students were required to continue with their journal entries throughout their study abroad experience, recording their thoughts, making connections to what had been presented to them in class, and synthesizing these with their previous knowledge and perceptions. The plan was to put one or two journal entries on the webpage each day along with accompanying photos from our digital camera. Due to the physical constraints encountered in-country, updating the webpage was only feasible four times during the eight-day stay.

> *"My family enjoyed seeing the updates – it put a little stress on them since they were constantly waiting to see updates." (student participant)*

> *"My parents checked it twice a day when we were gone. My....(illegible noun) also looked at everything before we left. She loved it!" (student participant)*

A variety of methods were attempted in trying to connect to the server at Iowa State University. The most reliable proved to be using the computer systems at the different universities and schools that we visited. Initially land-lines, cellular and satellite phones were incorporated into the different methods for connecting to the home server, but cost, accessibility, and the hotel/motel industry telephone wiring provided numerous obstacles which were difficult to overcome.

> *"It would have been more beneficial if we would have used it more in the country" (student participant)*

> *"My family like looking at it. I found it to be a pain @ first to put our (journal) entries on it but got the hang of it. If I can figure it out, anyone can!" (student participant)*

Completion of a summative evaluation was required of participants after returning from Costa Rica and after the completion of their learning journals (Table 2). The survey utilized a variety of questions and a five point semantic differential scale (1=strongly disagree, 5=strongly agree). Sojourners generally indicated that they agreed or strongly agreed that the experiential learning and the instructional techniques utilized in the course were of value to them. These ratings were confirmed in the students learning journal on class and in-country experiences.

Table 2. Satisfaction of participants with course technology.

Variable	Mean	SD
This study abroad has made me more receptive to different ideas	4.29	.77
I have gained better insight into myself	4.18	.73
I have a greater sense of self-confidence due to living abroad	4.00	.76
My interest in world events has increased	3.47	.79
My ability to adapt to new situations has increased	3.75	.73
This was the wrong academic program for me	1.19	.30
The instructor was effective	4.56	.49
The program was intellectually challenging	4.00	.63
I could have learned the same information at my home institution	1.36	.51
Creative work/ideas were adequately recognized	3.88	.55
You were free to work at your own pace	3.81	.61

N=17, bi-polar differential scale 1=strongly disagree, 5=strongly agree

Educational Importance

> *"Traveling to Costa Rica is an opportunity for us to look beyond the first impressions we have made. Sometimes being out of our comfort zone is necessary to facilitate learning, and such times are sure to occur during our adventure. Cross-cultural trips, such as the one we will be participating in, are the result of curiosity and a desire for knowledge and truth. May our goal be to take second, third, and even fourth looks at what we see." (student participant)*

It is evident from the student surveys and the participant comments that study abroad experiences are important and valuable educational opportunities. The technological innovations utilized in this approach to enhance the educational significance of this study abroad experience were highly evaluated by the sojourners. While the results of this study are generalizable only to the participants in this study, the concepts and innovations used can be duplicated to enhance the educational quality of all study abroad programs. These statements are backed up by countless articles touting the benefits of international experiences in the education of students (Andreasen & Wu, 1999; Dominguez & Radhakrishna, 1998; Dale & Martin, 1997; Tritz & Martin, 1997; Welton & Harbstreit, 1990).

> *"The web page was very beneficial. I told lots of people about it. My mom checked it out at work with her co-workers. They loved it." (student participant)*

In 1997, Nti, Layfield, and Radhakrishna examined the prospects for increasing the usage of communication technologies among agricultural educators. Their findings corroborate the results from this study, that the added benefits from the incorporation of electronic media are beneficial to students. It is easy to justify the need for incorporating electronic media, such as the internet and world wide web into one's bag of teaching tools. The triangulation this provides for assessing the benefits and value of these experiences to students is worthy of our efforts.

"My aunt is a 6th grade teacher and had her class followed our days in Costa Rica. They were very impressed and want to come to ISU to have the same experience." (student participant)

Conclusions and Recommendations

The increasing interest and importance of participation in study abroad experiences, coupled with the need to provide the requisite academic rigor and justify the expense of said experience, will necessitate the incorporation of innovative measures to meet the demands of all stakeholders involved. Students agreed that the intellectual and academic rigors of the program were challenging, adding credence to the ability of technology and the internet to enhance the educational value of programs such as these. The use of the internet and the supportive technology used to provide these linkages is vitally important.

If study abroad's can continue to make students more receptive to differences in cultures, people, and philosophies, then perhaps we can continue to improve the receptivity of others to diversity. The dividends it pays in the way of increased participant satisfaction, positive public relations, and promotion of the department, college, and university involved, are without price.

Let us continue to recommend study abroad opportunities to our students, while requiring that they maintain high standards of academic integrity, include appropriate technology to enhance and improve student learning, and strive for the impact that these experiences can have in their lives. By doing this we will take study abroad experiences from travel trips and make them the meaningful, experiential learning activities they were designed to be.

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Enhancing a Study Abroad Experience Through the Internet

A Critique

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The globalization trends occurring around the world are placing increased demands upon college students to have international experience prior to the time they graduate. The use of technology also offers additional opportunities to provide meaningful educational programs. Better understandings of how study abroad programs operate with technology is essential if they are to be considered as having high quality and students are to view them as enhancing their learning opportunities.

Systematic investigations of the use of technology in study abroad programs have received little attention by agricultural and extension educators. No specific studies of the use of technology in study abroad programs were cited in the references. This study provides an approach to such investigations. However, it would be difficult to replicate given the information presented in the paper. The use of both quantitative and qualitative approaches in conducting this study provides an opportunity to discern the value of technology used with study abroad programs. Another interesting possibility would have been for the sojourners to complete journals so that their responses also could have been examined.

The 20 students who participated in this study abroad program each prepared a journal regarding their experiences. From these journals only 11 quotes were included and tended to stress the importance of the web page to their families and friends. Only one of the quotes tended to assess the impact of the program. It would have been helpful if the author had analyzed the journals in greater depth and searched for key incidents, patterns, and categories and included information regarding the intensity of them. Perhaps the researcher could have maintained field notes to further enrich the qualitative data. This paper reported means and standard deviations for information related to ordinal data in Table 2. Again, a more appropriate reporting format would be to report frequencies and percents for each response category or group of categories.

It would have been helpful if the researcher had synthesized what he and the students had learned regarding the use of technology in study abroad programs. The paper did not identify elements of the study abroad course applicable to distance education technology (Objective 1). Also, it was difficult to determine how the investigator came to the conclusion that "... the intellectual and academic rigors of the program were challenging, adding credence to the ability of technology and the internet to enhance the educational value of programs such as these."

Learning Strategies for Distance Education Students

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Introduction

Distance education is growing rapidly. According to the U.S. Department of Education's National Center for Education Statistics (1997), 62% of public 4-year institutions offered distance education courses in the fall of 1995. An estimated 25,730 different distance education courses were delivered in the 1994-95 academic year with an estimated enrollment of 753,640 students. Distance education provides access to individuals in different geographical locations, individuals unable to attend classes on campus, and individuals who prefer to control the timing and pace of their learning (Moore, 1989; Willis, 1995a).

Distance education has been successful at providing access to individuals in various situations, but increasingly educators realize the need to address issues of quality. Quality is an important concern because distance education is substantially different from the traditional classroom. The teaching environment is one in which distance education instructors often must adapt teaching styles, develop an understanding of the delivery technology, and function effectively as a skilled facilitator and content provider (Willis, 1995a). Agricultural faculty recognize that the distance education environment is different and have expressed interest in information and training in the areas of teaching techniques, models of effective teaching, principles of teaching, and designing instruction (Miller & Carr, 1997).

If the teaching environment for agricultural faculty who teach distance education courses is so different and challenging that it necessitates training and assistance in course delivery, imagine how different the learning environment must be. Learning at a distance is fraught with unique challenges. Distance education students are often older and are coordinating various job and family commitments with their learning opportunities (Miller, 1995; Willis, 1995b). In addition, students at a distance usually have limited interaction because of geographic isolation from the instructor and other students (Miller, 1995; Willis, 1995a). Finally, distance education students must rely on the technology to provide information for learning (Willis, 1995a).

These distinctive differences in the distance environment have prompted faculty improvement workshops to provide information to help educators conquer the technology, but are opportunities available to assist students in succeeding in the distance environment? "In recent years, faculty development strategies have taken a different approach by addressing instructional improvement through skill development, enhancing support services, and ensuring that institutional reward structures reflect the rigorous challenges confronting the effective distance educator" (Willis, 1993, p. 279). Olgren (1998) claims that these faculty programs often emphasize teaching strategies and assume that good teaching will produce good learning. Should faculty be focusing their attention on empowering students to learn?

One such way to empower students is to focus on learning strategies. Learning strategies can be defined as thoughts and behaviors intended to influence the learner's ability to select, acquire, organize, and integrate new knowledge (Weinstein & Mayer, 1986). Learning strategies are designed to teach learners how to learn (Jonassen, 1985). Effective learning involves knowing when to use a specific strategy, how to access that particular strategy, as well as when to abandon an ineffective strategy (Jones, Sullivan Palincsar, Sederburg Olge, & Glynn Carr, 1987). According to Jones et al. (1987), both less proficient and more proficient students are able to develop effective learning strategies.

Learning strategies are important in today's lifelong learning environment. Today's society is facing a technological revolution where technology and information are constantly changing. This society is requiring that the workforce continually gain new knowledge to remain productive (Weisburg & Ullmer, 1995, p. 634). "It is clear that someone that has learned how to learn and someone that continues to learn throughout his/her lifetime will be a productive member of the workforce" (Drucker, 1994, as cited in Weisburg & Ullmer, 1995). Distance education provides an avenue by which individuals can access this new information and continue to learn for the rest of their lives.

While studies on effective learning strategies continue to emerge, the relevancy of these studies has not been determined for specific educational contexts such as distance education (Rothkopf, 1988, as cited in Bernt & Bugbee, 1990). Conversely, Schuemer (1993) contends that studies have shown that teaching and learning theories can be easily applied to distance education. Can studies on learning strategies conducted in traditional settings be applied to adult learners, the field of agriculture, and the distance education milieu?

Purpose and Objectives

The purpose of this paper is to identify potentially useful learning strategies for distance education environments. The specific objectives of this study include:

1. To identify a theoretical framework to classify learning strategies.
2. To determine the potential usefulness of specific learning tactics for off-campus learners in colleges of agriculture.

Methods

A library search was used to obtain information for this study. Literature searches using the Educational Resources Information Center (ERIC) and Psychological Abstracts (PsychLit) databases were conducted to determine the most appropriate theoretical framework. Over 16 theoretical approaches were examined. Once the theoretical framework was chosen, additional literature searches were conducted to identify studies that had examined specific learning tactics. Overall, 13 studies were reviewed to identify the successful tactics. However, only four of these studies focused on adult students in a distance education environment.

Findings

According to Pintrich (1988), a variety of taxonomies are available for describing and classifying students' learning strategies including those developed by Dansereau (1985), Pressley (1986), Weinstein and Mayer (1986), and McKeachie, Pintrich, Lin, and Smith (1986). Dansereau (1985) developed a theoretical framework for learning strategies that emphasized primary and support strategies. The primary strategies focused on learning strategies needed for text-based materials and support strategies needed for developing a mental environment. Although Dansereau provided a clear framework, the primary strategies were isolated to text-based applications. Pressley (1986) examined goal-specific, monitoring, and higher order learning strategies. While Pressley investigated the use of specific strategies, he did not provide a clear, conceptual framework to apply these learning strategies to other learning environments. The taxonomy developed by Weinstein and Mayer (1986) outlined learning strategies from a cognitive perspective. This cognitive approach identified specific strategies and methods available to learners to assist them with selection, acquisition, construction, and integration of knowledge (Weinstein & Mayer, 1986). In 1986, McKeachie et al. incorporated elements of several learning models, including the cognitive approach established by Weinstein and Mayer (1986), into a taxonomy of learning strategies. The taxonomy proposed by McKeachie and others encompasses the cognitive, metacognitive, and resource management aspects of learning (Figure 1).

Figure 1. Taxonomy of Learning Strategies.

According to McKeachie et al. (1986) and Weinstein and Mayer (1986), cognitive strategies are important for understanding how information is processed and encoded in a learning environment. Metacognitive strategies allow a student to monitor his/her performance through planning, monitoring, and self-regulation (McKeachie et al., 1986). Resource management strategies assist the student in managing the learning environment and available resources (McKeachie et al., 1986). McKeachie et al.'s (1986) taxonomy is a clear, concise, and comprehensive model that provides the theoretical framework for this study and identifies general learning strategies and specific learning tactics that may be examined in a distance education environment.

Cognitive Strategies. The cognitive component of McKeachie's taxonomy focuses on the methods by which students actively process information and structure this information into memory (Weinstein & Mayer, 1986). This active constructive process allows the learner to interpret information and connect it to existing cognitive structures (Schuemer, 1993). Specific cognitive strategies, in the model proposed by McKeachie et al. (1986), include rehearsal, elaboration, and organization.

Rehearsal strategies are employed by learners to remember material using repetition (Olgren, 1998). Specific rehearsal tactics include "repeating the material aloud, copying the material, taking selective verbatim notes and underlining the most important parts of the material" (Weinstein & Mayer, 1986, p. 318). In a study conducted on adult learners in distance education, Bernt and Bugbee (1990) examined specific tactics such as underlining/highlighting, memorizing material, and mentally rehearsing important ideas. No significant differences were found between students at different achievement levels and their reported use of these specific tactics (Bernt & Bugbee, 1990). In addition, the high achievement students reported the lowest percentage of memorizing material that was not understood (Bernt & Bugbee, 1990).

Elaboration is the process by which the learner builds an internal connection between what is being learned and previous knowledge. Specific tactics include paraphrasing, summarizing, creating analogies, generative note-taking, and question answering (McKeachie et al., 1986; Weinstein & Mayer, 1986). Miller (1997b), determined that 87% of the students in distance education courses delivered by videotape utilized an elaborative strategy by taking notes while viewing the videotape. Furthermore, Miller (1997a) determined that students who took notes were more likely to earn an A in their course. Bernt and Bugbee (1990) determined that elaboration strategies were used by 50-75% of the students at different achievement levels; however, no significant differences were found between failing students, low passers, and high passers on specific tactics such as trying to see how material applies to work situations, relating new material to familiar ideas, and translating material into their own words.

Organization is the process by which the learner organizes and builds connections with the information received in the learning environment (Olgren, 1998). Specific tactics associated with organization include the process of selecting the main idea through outlining, networking, and diagramming the information (McKeachie et al., 1986; Weinstein & Mayer, 1986). In the study conducted by Miller (1997b), 21.2% of the distance education students in videotaped situations employed organizational strategies by outlining class notes. However, Bernt and Bugbee (1990) found no significant differences between failing, low passing, and high passing students who reported very frequently or almost always organizing/condensing notes and summarizing with charts, diagrams, and outlines.

Metacognitive Strategies. The metacognitive component of the theoretical model focuses on the skills students use to plan their strategies for learning, to monitor their present learning, and to estimate their knowledge in a variety of domains (Everson, Tobias, & Laitusis, 1997). The purpose of such strategies is to improve self-regulation by encouraging students to test their understanding (Pace, 1985, as cited in Jonassen, 1985). The metacognitive strategies outlined by McKeachie et al. (1986) are similar to those of Everson et al. (1997) and include planning, monitoring, and regulating.

Planning includes such tactics as setting goals, skimming the material, and generating questions (McKeachie et al., 1986). According to Bernt and Bugbee (1990), 89% of the high passing students reported very frequently or almost always skimming each chapter before reading it. Conversely, only 35% of the failing students and 29% of the low passing students reported using this tactic (Bernt and Bugbee, 1990).

Monitoring and regulating are activities that utilize self-regulation (McKeachie et al., 1986). Monitoring involves the process by which learners check themselves for comprehension of knowledge or skills (Weinstein & Mayer, 1986). This process of self-monitoring has been found to contribute to improved acquisition, generalization, and transfer of knowledge (Wang & Lindvall, 1984, as cited in McCombs, 1988). Examples of this self-monitoring include self-testing, attention-focus, and employing test-taking strategies (McKeachie et al., 1986). Regulating involves such processes as adjusting reading rate, re-reading, reviewing, or utilizing test-taking strategies. The results of a study conducted by Zimmerman and Martinez Pons (1986) on 10th grade students indicated that self-regulated learning strategies could be correlated with academic achievement. Miller (1997b) determined that 43.9% of distance education students engaged in self-regulation by viewing videotapes for distance courses more than once. Furthermore, Miller (1997a) was able to the use this self-regulation strategy to predict student achievement as students who earned an A were more likely to view the videotape more than once.

Resource Management Strategies. The resource management strategies concern the quality and quantity of the task involvement (McKeachie et al., 1986). Strategies include resource management, study environment management, effort management, and support of others (McKeachie et al., 1986).

Resource management involves the process of developing well-defined goals and scheduling the course to obtain the best results. Scheduling is the process by which the student defines a specific time or creates a daily ritual, a weekly pattern, or some other type of arrangement (Eastmond, 1995). In fact, Eastmond (1995) conducted a qualitative study and determined that most students scheduled distance education courses into their agenda and developed study patterns to help them succeed. A quantitative study conducted by Miller (1997a) determined that students who earned an A were more likely to view the videotape in a distance education course as they received the tape. In this case, the students scheduled the video tape arrival as the designated time to complete the coursework.

Study environment management is the development of a setting that is conducive to learning. According to McKeachie et al. (1986), "the nature of the setting is as important as the fact that the student recognizes that this particular location is set aside for studying" (p. 29). Thus, the

student must designate a defined, quiet, and organized area in which to study. In a study conducted by Bernt and Bugbee (1990), 72-75% of students reported very frequently or almost always studying in a quiet place without interruption. However, no significant differences in achievement were attributed to environment. It is interesting to note that Bernt and Bugbee (1990) determined that high achievement students did not spend more time studying. The study by Miller (1997a) concurred with this finding by determining that students receiving A's also did not spend more time studying.

Effort management is the process by which a learner utilizes tactics such as attribution to effort, mood, self-talk, persistence, and self-reinforcement (McKeachie et al., 1986). However, these specific tactics are merely components of a more important tactic, motivation. Distance learners must be motivated. They are geographically isolated from the traditional learning environment and have accepted responsibility for their own learning (McCombs, 1988; Moore, 1989). Few studies have shown the importance of motivation in the distance education environment. One study, conducted by Oxford, Park-Oh, Ito, and Sumrall (1993), determined that motivation was the most significant determiner of achievement in teaching a second language using satellite television. Conversely, many motivational models exist for college student learning (McKeachie et al., 1986). For example, a study conducted by Sinkavich (1991) determined that motivation was one of the factors that had a significant impact on classroom performance.

Support of others is the final strategy associated with this taxonomy of learning strategies. Students must learn to utilize this support by seeking help from other students and the instructor (McKeachie et al., 1986). In a study conducted by Miller (1997b), only 6.8% of the students studied with one other person, only 4.5% studied with a group of students, and only 18.9% of students called the instructor in a videotaped distance education course. However, Miller (1997a) determined that students who called the instructor were more likely to earn an A in the videotaped distance education course. Eastmond (1995) confirmed the importance of the student-instructor interaction as students contacted their instructors while working through the assignments for the course.

Conclusions and Recommendations

This review and synthesis of the literature indicates that there is a paucity of learning strategy research involving adult students in a distance education environment. Although McKeachie et al.'s (1986) taxonomy of learning strategies was developed as a macrolevel approach to learning, only a few tactics have actually been measured in learning strategies research.

In terms of specific cognitive strategies, note-taking was the only tactic found to distinguish between achievement levels. Otherwise, no significant differences were found in the literature between student achievement levels based on students' level of use of specific tactics. Distance education students may have mastered most of the tactics identified by McKeachie et al. (1986) earlier in their educational careers and might routinely use these tactics for learning. If so, the lack of variability in the use of cognitive strategies may be a plausible explanation as to why this group of tactics has thus far not been very useful in discriminating among student achievement levels.

The metacognitive strategies and resource management strategies may provide adult students with the most promising tools to enhance their success in distance education courses.

Metacognitive strategies include planning, monitoring, and self-regulation. Planning tactics such as skimming the material and monitoring/self-regulation strategies such as self-testing and test-taking strategies have been utilized by high-achieving students (Zimmerman & Martinez Pons, 1986; Bernt & Bugbee, 1990; Miller, 1997a; Miller, 1997b)

The literature indicates that several resource management strategies may be useful predictors of distance education student achievement. These tactics include establishing a learning schedule, ensuring that the time spent studying is of high quality, maintaining a high level of motivation, and communicating with the instructor.

Research is needed to test experimentally the theoretical framework proposed by McKeachie et al. (1986) in the adult distance education environment. Research in this area should strive to answer the following questions:

- Can the most promising tactics (note-taking, skimming material, self-testing, test-taking strategies, developing study patterns, maintaining a high level of motivation, and communicating with the instructor) be used to enhance students' achievement of intended learning outcomes in an adult distance education setting?
- Is the theoretical framework, proposed by McKeachie et al. (1986), effective for explaining the relationship between learning strategies and students' achievement in the distance education environment?

Answers to these questions may provide useful information on how distance education students might apply these learning strategies, whether the strategies affect their ability to achieve intended learning outcomes to a greater degree, and result in an increased level of satisfaction with students' off-campus course experiences.

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Learning Strategies for Distance Education Students

A Critique

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Papers presented at conferences in agricultural and extension education have typically devoted too little attention to theoretical/conceptual frameworks. A theoretical/conceptual framework is an expression of apparent relations or underlying principles of certain phenomena based on verifiable evidence. Theoretical/conceptual frameworks can be described verbally and/or by illustration. To develop knowledge bases in agricultural and extension education it is essential that theoretical/conceptual frameworks be developed, analyzed, tested, and refined. These authors are to be complimented for their presentation of a theoretical framework for examining learning strategies used by students in distance education programs.

The taxonomy of learning styles advocated by the authors of this paper is one type of theoretical/conceptual framework that can help contribute to the knowledge based for distance education. The authors identified two important questions that educators should attempt to answer related to the theoretical framework. Other questions include: Do the most promising tactics differ between youth, adolescents and adults? What are ways that learners combine promising tactics to enhance their learning? Are learning strategies used differently in distance education than they are in traditional education programs? Would factor analysis of these learning strategies result in a taxonomy encompassing the cognitive, metacognitive, and resource management aspects of learning?

The authors used library research to collect the information for this study. It would have been helpful to know the descriptors used to search for information on approaches, learning strategies, and tactics. It also would have been informative to know the criteria used in selecting research included in the paper. Finally, it would have been helpful to know the criteria used in selecting the theoretical approach proposed.

It was unclear to this reviewer whether the authors determined the potential usefulness of specific learning tactics for off-campus learners in colleges of agriculture (Objective2). Some evidence related to each of the three aspects of learning and learning strategies were presented. However, no meta-analysis or other techniques were used to synthesize or justify the usefulness of the tactics.