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ABSTRACT

A conference proceedings on agricultural education research included: "Focusing for Excellence" (Jordan); "Factors Related to the Integration of International Agricultural Concepts into the Secondary Agricultural Education (AE) Curriculum" (Ibezim, McCracken); "Perceptions of State Vocational Education (VE) Administrators Relevant to AE in the Middle Grades" (Barrick, Hughes); "Preservice Elementary Education Majors Knowledge of Agriculture" (Humphrey et al.); "Assessment of the Personality Styles of Preservice Teachers of Agriculture" and "Preservice Teachers' Learning Styles and Their Relationship with Performance in a Methods of Teaching Agriculture Course" (Cano, Garton); "Summer Agricultural Program Activities" (Swan); "Description of Learning Styles of Farm Business Management Students in Southwestern Minnesota" (Baerg, Leske); "Relationship of Conflict Management Styles to Personality Preferences of Extension Administrators" (Earnest et al.); "Methodological Triangulation" (Fritz, Bell); "Analysis of Agricultural Mechanics Safety Practices in Agricultural Science Laboratories" (Swan); "Accidents and Accident Prevention in VE Laboratories" (Gliem, Miller); "Variables Influencing Undergraduate Students' Positive and Negative Attitudes toward Computerized Interactive Videodisc Instruction in Horticulture" (McCaslin et al.); "AE below the High School Level 1785-1920" (Parmley, Harbstreit); "Leadership Ability of Secondary Public School Teachers" (Kamrath, Swan); "Central Region Readership Survey of the 'FFA New Horizons' Magazine" (Connors et al.); "Assessing the Intended and Actual Levels of Cognition in Ohio Cooperative Extension Service County Agricultural Agents'/State Agricultural Specialists' Instructional Programs" (Miller, Ismail); "Perceptions, Responses and Knowledge about Diversity by Extension Administrators" (Ludwig, Cano); "Women Who Shattered the Glass Ceiling" (Maddy, Clark); "Integration of Mathematics into Agriculture Curriculum" (Miller, Gliem); "Student and Teacher Attitude toward and Performance in an Integrated Science/Agriculture Course" (Enderlin et al.); "The Influence of Agriscience and Natural Resources Curriculum on Students' Science Achievement Scores" (Connors, Elliot); "FFA and SAE Participation as Predictors of the Career Maturity of Secondary AE Students" (Bakar, McCracken); "Factors Related to the Egalitarianism of AE in Comprehensive and Vocational Schools" (McCracken, McLellan); "Examination of Indicators of School Effectiveness among Classes of School Location in Ohio Public Schools" (Peasley, McCracken); "Stage of Adoption and Level of Knowledge of Sustainable Agricultural Practices by Central Iowa Farmers" (Gamon et al.); "The Adoption of Sustainable Agriculture by Iowa Farmers" (Alonge, Martin); and "Predictors of Adult Vocational Student Retention" (Shank, McCracken). (KC)

FOCUSING RESEARCH IN AGRICULTURAL EDUCATION

Proceedings of the 47th Annual

CENTRAL REGION RESEARCH CONFERENCE IN AGRICULTURAL EDUCATION

March 6, 1993
Adam's Mark Hotel
St. Louis, Missouri

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compiled and edited by:

Robert J. Birkenholz
Leon G. Schumacher
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Preface

The Central Region Research Conference in Agricultural Education is the major forum for disseminating results of research and scholarly efforts within the Central Region of the American Association for Agricultural Education (AAAE). The research conference is an annual activity which involves the presentation of papers selected through a blind review process. Three discussants from within the profession, but from states outside the region were asked to review each paper proposal received for consideration.

There were 49 paper proposals reviewed for the 1993 Conference. Twenty-seven proposals were accepted after receiving recommendations from members of the external review panel. The acceptance rate for papers presented at the 1993 Central Region Research Conference was 55 percent. Two additional papers were accepted as alternates and published in the conference proceedings.

Authors of paper proposals accepted for presentation were asked to develop complete papers following guidelines provided by the conference co-chairs. Authors were also asked to pay a $3.00 per page fee to cover a portion of the printing and binding costs associated with publishing the proceedings.

Papers submitted for presentation at the Central Region Research Conference were forwarded to one of nine discussants selected from within the region who were asked to review three papers and to submit written comments which were also printed in the conference proceedings.

Papers presented at the 1993 Central Region Research Conference are listed in the table of contents in the order they were presented. Written comments provided by discussant are printed immediately after each respective paper.

Authors of papers delivered at the 1993 Central Region Research Conference were allowed 15 minutes for their presentation. Three papers were presented in each of nine sessions. Discussant comments were presented orally following the conclusion of the three paper presentations in each session. Following the discussant comments, paper presenters were provided with the opportunity to respond to questions or concerns 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 one and one half hour session.

The purposes of the Central Region Research Conference were:

1. To present, disseminate, and discuss recent Agricultural Education research.

2. To present and disseminate reviews of Agricultural Education research.

3. To provide a forum for discussing the implications of Agricultural Education research.

Acknowledgements

Forty-nine proposals were received and 27 papers were accepted for presentation at the 1993 Central Region Research Conference in Agricultural Education. Three reviewers, one from each of the AAAE Regions outside the Central Region, read each paper proposal as part of the blind review process. Independent recommendations and numerical ratings were examined to select papers to be presented. Sincere gratitude is extended to the following individuals who served as external paper proposal reviewers for the 1993 Central States Research Conference in Agricultural Education.

Arthur Berkey, Cornell University
Tom Bruening, Pennsylvania State University
Stanley Burke, Virginia Tech
Lee Cole, Oregon State University
Jacquelyn Deeds, Mississippi State University
Tom Dormody, New Mexico State University
Jack Elliot, University of Arizona
Stacy Gartin, West Virginia University
Maynard Iverson, University of Georgia
Don Johnson, Mississippi State University
James Key, Oklahoma State University
Alvin Larke, Texas A&M University
Jasper Lee, Mississippi State University
Vern Luft, University of Nevada
Gary Moore, North Carolina State University
Michael Newman, Mississippi State University
Kerry Odell, West Virginia University
Lou Riesenberg, University of Idaho
Tim Rollins, Pennsylvania State University
Dennis Scanlon, Pennsylvania State University
Gary Straquadine, Utah State University

Sincere thanks are also extended to a number of individuals who helped plan and organize the 1993 Central Region Research Conference. Information and materials provided by Julia Gamon, Curtis Norenberg, and Steve Harbstreit were especially helpful in organizing the conference. Appreciation is also extended to Sherri Griffy, Sandy Kaiser, Jennifer Lichte, Amy Lorance, and Barbara Rothenberger for their help with registration and other behind-the-scenes assistance. Finally, sincere appreciation must be expressed to the authors who submitted paper proposals for consideration. Without the high quality of research undertaken in the Agricultural Education profession, there would be no need for such a conference. To each of you we express our sincere gratitude. Thanks!

Robert J. Birkenholz
Leon G. Schumacher

Discussants, Session Chairs, and Facilitators

Discussants

Earl Russell, University of Illinois
Steven R. Harbstreit, Kansas State University
Robert A. Martin, Iowa State University
Clark Hanson, South Dakota State University
J. Robert Warmbrod, The Ohio State University
Roland Peterson, University of Minnesota
Alan A. Kahler, Iowa State University
Lloyd Bell, University of Nebraska
R. Kirby Barrick, The Ohio State University

Session Chairs

Martin J. Frick, Purdue University
Edward W. Osborne, University of Illinois
Jerry L. Peters, Purdue University
W. Wade Miller, Iowa State University
Richard I. Carter, Iowa State University
Julia A. Gamon, Iowa State University
N. L. McCaslin, The Ohio State University
Bob R. Stewart, University of Missouri
Dale A. Law, University of Illinois

Facilitators

Robert Torres, The Ohio State University
Donald D. Peasley, The Ohio State University
Jan D'Haem, Michigan State University
Barbara Rothenberger, University of Missouri
Jeff Hardesty, Purdue University
Garee W. Earnest, The Ohio State University
David Krueger, Michigan State University
Bryan Garton, The Ohio State University
Michael L. Kamrath, North Dakota State University

Schedule of Responsibility for Future Central Region Research Conferences in Agricultural Education

1994	North Dakota
1995	Nebraska
1996	Minnesota
1997	Indiana
1998	South Dakota
1999	Michigan
2000	Illinois
2001	Ohio
2002	Kansas
2003	Wisconsin
2004	Iowa
2005	Missouri

FOCUSING FOR EXCELLENCE

John Patrick Jordan
Administrator
Cooperative State Research Service
U.S. Department of Agriculture

I am truly delighted to be here today and to share with you some of my thoughts on research in agricultural education. Your theme for this conference, "Focusing Research in Agricultural Education," is perfect for our times. And, I have chosen to entitle this speech, "Focusing For Excellence." We now exist in a world of change -- and one pervasive result of change in education is the need for greater efficiency, effectiveness, and accountability in our research and education programs. Thus, it is critically important that our research and education programs be more focused than ever before.

I am sure many of you are quite familiar with the Cooperative State Research Service of the U.S. Department of Agriculture. Yet, I expect there are those among us today who are less familiar with CSRS. So, I want to begin my remarks by reacquainting some of you with CSRS and introducing others to CSRS perhaps for the first time. I then want to share with you some of my feelings and perceptions on the profession of teaching and the importance of quality teaching in today's educational programs. Finally, I will visit with you about the importance of research in agricultural education.

The Cooperative State Research Service is the U.S. Department of Agriculture's principal entree to the university system of the United States for the purpose of conducting agricultural research and education programs. CSRS participates with the States and other sources of funding to encourage and assist the colleges and universities in the conduct of agricultural research and education through colleges of agriculture, agricultural experiment stations, schools of forestry, 1890 land-grant institutions, colleges of veterinary medicine, schools and colleges of home economics, and other closely allied units. Considering all of the publicly supported agricultural research, the partnership between CSRS and the States has supported at least 63 percent of all publicly supported agricultural research (based on FY 1991 figures).

Investments in research have produced hybrid crops and specially adapted animals, labor saving equipment, improved cultural practices, vaccines against diseases which threaten human and animal life, and chemicals which enhance growth and protect plants from pests. Research has developed major breakthroughs in preserving the environment, and addressing rural problems. These developments have increased our standard of living and provided a wide variety of food and fiber at reasonable prices.

As remarkable as these achievements have been, they are merely the cornerstone for discoveries yet to be made. Among the fantastic tools now at our disposal is biotechnology. Biotechnology allows us the ability to match agricultural products to the environment in which they are to be grown and to map the plant the animal genomes.

The full potential of this tool is a long way from being reached.

Although CSRS is primarily a research organization, we are also delighted to be involved in higher education. CSRS is the Federal government's lead agency for higher education in the food and agriculture sciences. Through our Office of Higher Education Programs, led by Dr. Kyle Jane Coulter and an unbelievably energetic staff, USDA supports and encourages efforts aimed at providing the expertise required by the Nation's modern, high-technology, knowledge-based food and agricultural system.

Notice the publication entitled "Invest in Success" that has been distributed at your tables. This publication highlights the programs and accomplishments of our Office of Higher Education such as the Food and Agricultural Sciences National Needs Graduate Fellowships Program, The Higher Education Challenge Grants Program, and the 1980 Institution Teaching and Research Capacity Building Grants Program. Hopefully, many of you are familiar with the Challenge Grants program, and either have submitted or plan to submit proposals in areas such as curriculum development, faculty enhancement, instruction delivery systems, and student experiential learning. We also invite you to consider ways you can participate in the Capacity Building Grants program by cooperating with the 1890 historically Black land-grant institutions in research and teaching projects.

Our Higher Education Programs office also sponsors FAEIS -- the Food and Agricultural Education Information System -- a national computerized, on-line, information system which contains a wealth of State, regional, and national data on academic programs, students, graduates, faculty, and resources in the food and agricultural sciences, home economics, natural resources and forestry, and veterinary medicine. If you are not already using FAEIS, I strongly encourage you to learn more about this unique system. I believe this system is an invaluable resource for your research and education programs.

Although our Congressional mandate addresses higher education, we have also been involved with several programs in support of secondary agricultural education. Along with the U.S. Department of Education, we convinced the National Research Council Board on Agriculture to undertake a study on agricultural education in the secondary schools. I might also add we provided a little more than half of the funds for the study which resulted in the report "Understanding Agriculture: New Directions for Education." More recently, our Higher Education Programs office has administered the Congressional appropriations for The National Council for Agricultural Education's highly successful Aquaculture Curriculum Development Project. So we are certainly no strangers to agricultural education programs at the secondary level.

I hope this helps you to understand better the full range of activities carried out by our higher education staff. Now, I want to focus our attention on the importance of teaching and learning in the food and agricultural sciences.

New and innovative, developments in learning when applied to the classroom are

the driving forces for the adaptation of higher education in a changing world. Quite literally, in today's dynamic world, key developments in teaching and learning will determine whether we succeed or fail as viable societies.

In my role as administrator of CSRS, I have enjoyed the unique opportunity of serving at the intellectual interface between our government and the autonomous teaching institutions in our country. In this unique position, I feel I have had a significant role in many of the educational changes that have taken place but also have had the opportunity to stand back from the day to day activities and appreciate the long view of the progress being made in agricultural higher education.

I would like to present my discussion in a framework built from several key questions. For in the process of appropriately answering these questions, we will be able to illustrate some of the good things found in our learning system.

Structuring my remarks around a framework of questions reminds me of a quote attributed to Disraeli. He is reported to have said, "Every time the English had the answer the Irish changed the question." I want to assure the chair of this conference: I will not change the questions and I will attempt to provide some stimulating answers.

First, two introductory questions: What is it that we should be teaching, and the companion query, why must it be taught? After establishing what it is we want to teach and why, we want to reflect for a moment on who it is we are attempting to teach. Obviously, if the student is the intended receptacle of our arcane knowledge then the learning style and characteristics of this repository should be well understood. Finally, I hope to properly arrive at the motive for today, how to do the best teaching, how to maximize the learning?

Let me begin by reminding ourselves of what agriculture is. Historian Will Durant in his epic study, "the Story of Civilization" points out that "-man began with fire, civilization began with agriculture." The unique centrality of agriculture is no less true today. Agriculture pervades the fabric of any society. No matter how technologically advanced, how diverse or how cosmopolitan our individual societies may have become, each depends on an elaborate integrated food gathering system. And, we are all unfortunately aware that this elaborate system can be dramatically impeded by seemingly small changes in predilection in any of a variety of non-agricultural human activities. Wendell Berry, a noted American author and philosopher, summarized nicely for us the role of the agricultural college in modern society.

> "-if we conceive of a culture as one body which it is, we see that all of its disciplines are everybody's business, and that the proper university product is therefore not a whittled-down, isolated mentality of expertise, but a mind competent in all its concerns. To such a mind it would be clear that there are agricultural disciplines that have nothing to do with crop production, just as there are agricultural obligations that belong to people who are not farmers."

So then it seems obvious, what we must teach is expansive at best and disparate at worst. The social sciences, humanistic studies, physical and biological sciences must all accompany our traditional studies of crops, animal science, entomology, range management, and other agricultural production orientated courses. And all of these appropriate areas of study need to be vigorously supported by significant focus on advancing the communication skills of our students.

This is what we must teach. And the why is obvious, for if we are desirous of graduates who are effective leaders, to ensure success and stability for our national and international agricultures, then our charges must emerge from the academy with the skills and understanding to deal with an agriculture interfacing all of society.

The key as we see it is education in context. Not education piecemeal, a crops course here a chemistry course there, sociology sometime, history maybe never. In a society where agriculture is so ubiquitous our graduates must be able to deal with the environment, economic realities, crop production issues, religious sensitivities, political realities, and nutritional imperatives. Agricultural production courses can no longer be taught in isolation. They must be presented in a context that recognizes the socio-economic, political, and environmental realities of the "real world".

Education in context is something very easy to proclaim but very difficult to accomplish. Shortly, I want to share several effective programs and concepts helpful in realizing the goal of agricultural education in context, but first a word about our students, the object of our contextual learning. A number of significant studies at a variety of colleges of agriculture in the United States have revealed interesting information on the personalities and learning styles of students choosing agriculture as a course of study. Significance was added to these studies when it was found that the personality type and learning style of most of our faculty was diametrically opposite that of our students. The concern here of course is the well known fact that one teaches as one learned. Therefore, if I was successful learning in a certain way, I will teach that way and assume my students are best served by this method.

What we have found at our colleges of agriculture is an extremely high proportion (70%) of students are practically orientated or "sensing type" students. Students interested first and primarily in the practicality of information and the "how to" of ideas. They tend to be much less interested in the theory or gestalt surrounding an idea. Presented with theory before function they will, in many cases, "turn off" the learning experience because it seems to them to be of little value. Our faculties on the other hand are made up of a preponderance of "intuitive types", passionately concerned with theory, rarely with the essential practicality of an idea. As a result, these teachers are doctrinaire in their practice of insisting on presenting theory first and foremost and, then, maybe the practicality of the concept. This is obviously the antithesis of good pedagogy aimed at sensing type students. Changes must and are being made in the presentation of ideas. Faculty are learning to present the practicality of an idea, sharing the real world issues allied with the concept, and then subsequently introducing the underlying theories that support the concept. To the "intuitive" faculty this seems like a backwards

approach, but for the "sensing" students it is the successful approach.

To aid us in this type of change in our approach to education, we have begun to utilize "active learning" to better advantage. Active learning is just that, actually engaging students in the process of their own learning experience. The old traditional lecture method where the professor talks and the student listens may still dominate on some campuses, but, it is not a very effective way of learning. Recent research suggests that students must do more than just listen. They must read, write, talk, and engage in problem solving. This allows students to engage in the higher-order thinking tasks such as analysis, synthesis, and evaluation. In the experience of learning, students must "do things" and think about what they are doing. In many instances the students prefer this type of learning experience. Furthermore research on personality types and learning styles suggests that it is a superior method, especially in the area of reasoning and ethical understanding. And, I realize active learning is not a new concept to you; the phrases "Learning to Do" and "Doing to Learn" have echoed through the halls of agricultural education for decades.

Let me now share with you a few practical and successful examples of pedagogy that address context, communication and practicality.

Programs such as writing across the curriculum, critical thinking seminars, capstone courses, and the use of case studies are probably familiar to many of us. Recently, much has been written and discussed regarding these successful teaching strategies. Yet, all too often, implementation has lagged behind the rhetoric.

Writing across the curriculum is a mechanism perfectly suited to enhance the skills of agricultural students. The theory underlying this teaching mechanism is based on the knowledge that one writes more effectively when writing about subjects familiar and interesting. Thus, a student in agriculture should conceivably write better and learn more when writing assignments are geared to important and interesting issues germane to the student's major. As a result, colleges of agriculture at American universities are now relocating much of the rhetorical responsibilities to the student's major department rather than as a separate department serving all of the university. Introductory, intermediate, and advanced courses in the major subject matter area are now requiring very significant writing assignments and these assignments are graded not only for content, but also style and grammar. Equally important is the development of the students' oral skills. Previously, instruction in oral communication was isolated in separate courses. But now, more and more intermediate and advanced major discipline courses require a significant number of oral presentations, and forensic opportunities. Students now learn not only the factual information and theory underlying a subject but develop skills involving its logical presentation and communication.

Closely allied with this communications concept is the development and use of courses in critical thinking. Unfortunately sound critical thinking, like common sense, is not always common among students. In fact, it is surprisingly absent among students inclined to the practical sciences. By introducing students earlier in their academic

careers to the concept of organized logical, reasoning and coupling this with enhanced communication skills, students emerge from a study of their major courses with the ability to integrate acquired knowledge in a coherent manner.

A specific form of this type of learning is the "case study" approach, long popular in U.S. business schools. At our major universities a variety of case studies involving agricultural issues are being developed to assist students in experiencing "real world" problems. In such a teaching situation, the instructor defines a contemporary problem, the students formulate a problem objective, and team members or individuals delineate facts, constraints, opportunities, and assumptions. Possible solutions to the problem are generated which students and/or the teacher analyze and evaluate. Eventually, each student or team makes a thorough comprehensive report to the class. Such a process teaches the student to read, research, analyze, synthesize, draw conclusions, and communicate. This technique is especially effective when problems of an interdisciplinary nature, are dealt with by a team of students drawn from a variety of different disciplines.

Modulization of several courses has been another effective way of implementing contextual learning in the curriculum. This approach has also been found to be an excellent tool to improve student retention. Simply explained, several courses are linked together through course content and enrollment. For instance, twenty students take the same biology, communication, and history courses. Term papers and other writing assignments are assigned across all three courses. The basic biology is taught within a historical context, while the history course makes significant reference to the development of biology. The communications class requires assignments drawn from the biology and history experience. The advantage of linking the courses is twofold. First it allows the students to become familiar with their peers. Then, comfortable in a non-threatening atmosphere, the students integrate material from several disciplines and share it orally or in writing with their fellows. This approach "bonds" the students to the college or university and makes them feel like participatory members of the community of scholars. When this occurs among beginning students, a higher rate of student retention is noted. Obviously, this results in part from the friendships and social bonds the new students form with each other but also because of the feeling of "real learning" or "meaningful learning" experienced by the students that enriches their university encounters. We have found this to be especially true for highly gifted students.

Another important concept that is necessarily best approached by incorporating an emphasis across the curriculum is globalization. Presently our colleges of agriculture are keenly aware of their responsibility to prepare graduates to function in a small world suddenly made even smaller. Central to globalization of our curriculum is our effort to impart understanding in four key areas. We are striving to insure that our students understand the international system of which they will be an integral part. They must understand other cultures with which they will interact and understand the agriculture of other countries with which they may be cooperating and/or competing. Finally, our students need clear understanding of how economic policies differ in other countries. These areas of understanding obviously cannot be taught as separate entities but must be

integrated into the total curricula experience.

But, the key in globalization of a curriculum is the international experience. I'm concerned that this remains an area of woeful neglect by our colleges of agriculture. The fact that the United States is isolated from many of its sister countries by two large puddles of water can no longer be used as an excuse for academic and intellectual isolation. We simply have to send our students abroad to see, socialize, study, and absorb other cultures. There is no good substitute for this type of learning activity. And further to succeed in this imperative, we absolutely must begin with a significant increase in meaningful faculty exchange programs. Faculty indentured to American commerce, culture, and education offer little incentive to students to broaden their outlook to include the other 87 percent of the earth's inhabitants.

Learning in context as we have been describing it, offers our students another advantage. Because we are trying to integrate writing, thinking, and problem solving into a curriculum that is at the same time global, and contextual, we are also better able to cultivate an attitude of learning throughout life.

A predisposition for life-long learning is an imperative if one is to function effectively in this constantly changing world. A sound understanding of the learning experience is probably the best educational gift we can bestow to our charges. And active, contextual learning is perfectly suited to ensure such an outcome.

Life-long learning as well as more traditional pedagogy, has been greatly aided recently by the establishment of the Agricultural Satellite Corporation. This new agricultural information and instructional service called AG*SAT combines satellite, audio/video, and computer technologies. Presently thirty seven leading academic institutions affiliated with AG*SAT share academic instruction, cooperative extension programming, and agricultural research information.

It has been our experience that agricultural higher education must be an education in context. An education organized as a whole or entity, not an education of disparate parts. And this education must early on take into consideration the learning styles of its students. Teaching for the teacher is unacceptable, teaching for the student is requisite. And finally, modes and methods of active learning which involve the student in his or her own education prove to be the superior style for our times and impart to the student a valuable legacy, the appreciation of life-long learning.

So what does this mean for research in agricultural education? It seems appropriate to me that the agricultural education faculty are the ideal faculty to be involved in research addressing these important issues in teaching and learning such as contextual learning, learning styles, teaching methods, and active learning. After all, you are the experts on teaching and learning. And, after reviewing the titles of the papers that were presented at the 1992 National Agricultural Education Research Meeting here in St. Louis, I am pleased to note that you are engaged in research in areas such as computer-aided instruction, interactive video, learning styles, pre-service and in-service

needs of teachers, problem solving, student achievement, and leadership life skill development. I commend you for choosing to conduct research in areas such as these, and I trust you to continue to conduct research in these areas.

However, I want to issue a challenge to you today -- a challenge that is not necessarily related to the topics of your research, nor to the theoretical foundations of your research, nor to the methods of your research. My challenge to you today is related to the IMPACT of your research. Far be it from me to suggest that theory and methodology are not important -- they are important. But, let us not allow debates over quantitative versus qualitative paradigms or true experimental designs versus correlational studies to over-shadow the omnibus objective of our research which is to learn about strengthening teaching and learning.

I am the Administrator of a Federal research agency that will expend about 485 million dollars in Fiscal Year 1993 on research and education programs in the food and agricultural sciences. When I report to the U.S. Congress and to the President of the United States at the end of this year, they want to know, as does the American public, the IMPACT of these expenditures. I challenge you to hold the same standards of excellence for your research initiatives as we hold for the research initiatives in CSRS and in our partner colleges and universities in the fifty States and the U.S. Territories.

Recall that the title I used for this presentation was "Focusing For Excellence." The significance of the words "focusing" and "excellence" is obvious. But that little word "for" is significant as well -- because outstanding research programs must not only focus "on" excellence, they must focus "for" excellence. A contemporary surgeon might use laser technology. Stated very simply, that surgeon would take an amazingly powerful source of energy and focus that energy to make a clean, less intrusive incision or excision. However, if that energy were diffused rather than focused, the total amount of energy would not be reduced but the impact of the energy certainly would be greatly reduced.

No doubt, we have set a high standard of excellence for each individual research project we undertake; our research projects are focused on excellence. But, if we bring cohesiveness to our research projects -- that is, if we focus our research energy toward specific substantive educational issues, the total impact of our research energy has the potential to be much greater; our research program would be focused for excellence. Our research programs need to be focused -- yes, focused on excellence, but more importantly, focused for excellence.

Earlier in this presentation I spoke of historian Will Durant's admonition that "civilization began with agriculture." John Henry Newman, the renowned Catholic educator spoke of civilization also and his words are a fitting conclusion. "Civilization", he said, "must be the continuous development of intellect and mind." That's what John Henry Newman was about in 1850 and that's what it's still about in 1993.

FACTORS RELATED TO THE INTEGRATION OF INTERNATIONAL AGRICULTURAL CONCEPTS INTO THE SECONDARY AGRICULTURAL EDUCATION CURRICULUM

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INTRODUCTION

Global education has been defined as a process that provides students and individuals with knowledge, skills and attitudes necessary for them to meet their responsibilities as citizens of their community, state, and nation in an increasingly interdependent and complex global society (Florida Task Force, 1982). The development of agricultural industry in any country is inextricably linked to changes in global economy and education. The mission of agricultural education in the United States is to foster the development of knowledge and skills related to the industry of agriculture (National Task Force, 1987). In order to achieve this mission, students and educators must understand the global nature of agricultural economic competition and its effect on United States domestic food production. In 1988, the National Research Council recommended that the dominance of local production agriculture in the curriculum must be broadened to include global concepts on utilization of agricultural commodities, agriscience marketing and management. The implementation of this recommendation requires a major change in the agricultural curriculum.

One major challenge to agricultural educators in the next decade will be how to address the issue of the growing complexity in global interdependence (McCracken, 1990). The Commission on Global Education (1987) reported that schools were not responding fully to the increasingly need to educate students for citizenship, nor were they recognizing the global demands which would be expected of U.S citizens in the future. The National Research Council (1988) observed that agricultural education in U.S secondary schools usually does not extend beyond the offering of a vocational agriculture program, which has resulted in a steady decline in student enrollment over the past ten years. According to Hemp (1980), the practice of basing agriculture courses of study entirely on local farm practce and preparing students for employment in the local community is no longer a defensible approach to the development of agricultural education program in secondary schools. A curriculum based on domestic agriculture alone can no longer hold student interest nor substantially attract new enrollment to agriculture classes.

White (1990) noted that internationalizing agricultural education sparked students interest, revitalized agricultural education programs, and most importantly, provided students with a more complete picture of agricultural education. The ultimate competitiveness of U.S. agriculture in the global arena will depend upon the availability of agriculturally

educated individuals (International Committee on Organization and Policy, ICOP, 1990). It has become clear that for a student to be considered educated in agriculture, he or she must be cognizant of the interrelationships of various agricultural systems and the governments, cultures and societies in which they function. It is no longer sufficient to know how to produce food and fiber and carry out the operations in today's agricultural industry (Martin, 1990).

Several factors have been identified to be related to the implementation of an educational change. Educators who were involved in international programs tend to have a more positive attitude about international educational programs (Reaman & Etling, 1990), and were more likely to integrate international concepts into their curricula than those without such experience (Pause & Swanson, 1980; and Reisch, 1989). Reisch further stated that the key elements affecting the internationalization of the agricultural curriculum in primary and secondary schools were the teachers knowledge of international aspects and awareness of global interdependence and cultures of other people.

Davis (1989) reported that teachers were interested in infusing international agricultural concepts into their curriculum but were at loss about what to teach. Teachers also lacked the knowledge base to make such instruction relevant. Successful implementation of international agriculture would require both affective and behavioral changes in the individual teachers involved in the integration of global perspectives.

Fullan (1982) indicated that active administrative commitment and leadership at the school level, quality and frequency of collegial interaction among educators, and the availability of validated resource materials are necessary for successful implementation of an educational innovation. Fullan concluded that the more teachers experience the rewards of interaction the more they will use the criterion of professional contact and development as a means to become more involved in educational innovation.

Teacher participation in in-service workshops on curriculum development has been found to be related to curriculum integration (Darr, 1985; Pepple, 1986, and McKeown, 1990). Pierce (1981) reported that young teachers with higher levels of formal education are more likely to implement educational innovation.

Teachers of agriculture (Kellogg, 1984) have a responsibility to present educational materials from a perspective which explicitly takes into account the international and foreign dimensions of agriculture. Agricultural teachers have demonstrated favorable attitudes toward international agricultural programs (Hossain, & Moore, 1992; and Ludwig, 1991). However, high school students continue to have a limited awareness of international concepts (McCracken, 1990; Harbstreit & Welton,1992). No research has been conducted on the extent of integration of international agricultural concepts and the factors influencing the integration efforts. Information derived from this study would be helpful in planing and developing support programs and activities for agricultural educators involved in internationalizing their agricultural instruction.

PURPOSE AND OBJECTIVE

The purpose of the study was to explore and describe the factors related to the integration of international concepts into the secondary agricultural education curriculum in the north central region of the United States. Specific objectives of the study were:

1. Describe the extent to which international agricultural concepts were taught in secondary agricultural education programs in the north central region of the United States.

2. Determine the relationship between the extent of integration of international agricultural concepts and selected demographic variables: age, tenure, level of education, and school location.

3. Determine the relationship between the extent of integration of international agricultural concepts and international experience variables: knowledge of international agriculture, in-service workshop, international travel and cultural awareness.

4. Determine the relationship between the extent of integration of international agricultural concepts and work-related variables: attitude towards international agriculture, institutional commitments, sources of information and resource utilized.

PROCEDURES

Design. A descriptive research design with a correlational component was utilized for the study. Relationships among naturally occurring phenomena were examined without intervention. Correlational research identifies and describes relationships among natural occurring phenomena (Fraenkel & Wallen, 1990), and it is useful in predicting from one variable to another (Ary, Jacob, & Razavich 1985).

Population And Sample. The target population was the secondary school agricultural teachers in the twelve states of the North Central Region: Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. There were 2,612 secondary agricultural teachers in the population identified from Henry (1992). A systematic sampling method with a random start was utilized to draw a representative sample of 332 agricultural teachers from the population. A sampling interval of eight was determined by dividing the population size by the required sample size. Every eighth secondary school agricultural teacher in each of the twelve states was drawn beginning with the fourth teacher on the list. The systematic sampling technique enhanced the control of sampling error. Fowler (1988) indicated that systematic sampling yields a precision equivalent to a simple random sample, but possesses the benefits of a stratified random sampling. There was a 95% probability of a sampling error of less than 5%.

Instrumentation. The researchers developed the instrument. The questionnaire was divided into four parts. Part one of the instrument measured the extent to which international agricultural concepts were taught in the secondary agricultural classes. Part two consisted of these

variables: knowledge of international agriculture, participation in an internationalization workshop, international travel and cultural awareness. Part three assessed teachers' work-related characteristics: attitude towards international agriculture, institutional commitment, sources of information and the instructional material utilized. Part four collected the teachers demographic information. Likert-type summated scales were developed to measure the extent of integration, cultural awareness, attitude toward international agriculture, and institutional commitment. Knowledge was measured by a series of true or false cognitive statements drawn from various international agricultural dimensions. Content validity was established by a panel of experts consisting of graduate students and faculty members from The Ohio State University. Twenty agricultural teachers from the population, who did not participate in the study were used for the pilot test. Cronbach's alpha was used as a measure of internal consistency for sections of scaled items yielding reliability coefficients ranging from .63 to .94.

Data Collection. A questionnaire packet with a cover letter was mailed in May 1992. After the initial and follow-up mailing and a postcard reminder, a 15% random sample of non-respondent was interviewed. Comparisons were made between respondents and non-respondents, and between early and late respondents. There were no statistical significant differences between either of the groups, therefore, justifying generalization from the respondents to sample and population. The overall response rate was 70% (n=231), however only 66% (n=220) of the responses were usable.

Data Analysis. Descriptive statistics consisting of frequencies, means, percentages and standard deviations were calculated for all the variables. Pearson-product moment correlation coefficient and Kendall's Tau C were used to determine the relationships between variables. Semipartial regression analysis was used to identify independent variable set which contributed to the teachers' extent of integration of international concepts scores.

FINDINGS

Demographic Variables. Sixty four percent of the teachers in the sample had taught agriculture for over 10 years. Ninety four percent were male and 6% were female. The mean age of the teachers was 35 years. Seventy percent of the agricultural teachers taught in schools located in rural areas. Fifty percent of the teachers had earned a Masters Degree while 46% had Bachelor Degrees. One percent had obtained an Associate Degree as the highest college degree, and 2% had doctoral degrees.

Extent of Integration. Nine different international agricultural dimensions suggested by McCracken & Magisos (1989), and the National Task Force (1987), were used to measure the extent of integration of international concepts. Overall, 58% of the teachers reported that they taught international agricultural concepts in their agricultural classes. Table 1 shows the rank order and mean scores reflecting the extent to which the various international agricultural dimensions were taught in the secondary school agricultural classes. On a 5-point scale (1=never taught, 5=aways teach), the most integrated international concept in secondary

agricultural classes was the origin of crop dimension with a mean of 3.2. Agricultural technology, agricultural trade, and geographical factors received a mean score of 2.9. International agricultural practice was the least taught international concept (mean=2.2). The overall mean score on the extent of integration was 2.74.

Of all the twelve states sampled in the study, Ohio ranked first on the extent of integration with a mean score of 2.91, followed by Wisconsin (2.90). Minnesota ranked 12th with a mean score of 2.34. The states of Ohio, Wisconsin, Missouri, Illinois, Indiana, and Kansas scored above the overall mean of 2.74, while Michgan, South Dakota, North Dakota, Iowa, Nebraska, and Minnesota scored below the overall mean.

Table 1

Rank Order and Mean Scores Reflecting the Extent of Integration of International Agricultural Dimensions (n=220)

International Agricultural Dimensions	Rank	Mean	S. D.
Origin of Crops	1	3.2	1.1
Agricultural Technology	2	2.9	1.0
Agricultural Trade	3	2.9	1.1
Geographical Factors	4	2.9	1.2
Economic Factors	5	2.8	1.0
Political Factors	6	2.8	1.1
Consumption of Food and Fibre	7	2.7	1.0
Cultural Factors	8	2.4	0.9
Agricultural Practice	9	2.2	0.9

Measured on a 5 point scale; 1=never, 2=really, 3=sometimes, 4=frequently, 5=always. Overall Mean=2.74, Standard Deviation=.67.

International Experience. A Large proportion (84%) of the teachers have not participated in any in-service workshop on international agriculture, although 16% reported they had attended at least one such workshop. Most of the workshops were organized by the respective state universities. Eighty five percent of the teachers had been to other countries, mostly in Europe, South and North America, for military service and educational reasons.

Teachers knowledge of international agricultural concepts was measured by a series of dichotomous (true or false) statements using six different dimensions of international agriculture. Over 88% of the teachers identified the correct statements on the agricultural technology dimension, 77% on agricultural trade, 70% on agricultural practice, 52% on

agricultural production and food consumption, and 49% on origin crop dimensions.

Almost 92% of the respondents expressed a high degree of awareness about cultural differences amoung people. The overall mean for the construct "cultural awareness" was 4.98 on a 6-point scale (1=strongly disagree, 6=strongly agree), and the standard deviation was .53.

Work-Related Characteristics. Over 83% of the teachers expressed positive attitudes towards integrating international agricultural concepts into their agricultural program. The overall mean score for this construct was 4.47 on a 6-point scale (1=strongly disagree, 6=strongly agree), and the standard deviation was .66. Eighty percent of the teachers indicated they were committed to make their agricultural program more internationally focused. Overall, the respondents agreed that the state department of education and school administration should be actively committed to internationalization of secondary agricultural curricula. The mean scores for teacher commitment was 4.39, state department of education commitment was 4.71, school commitment was 1.25 and principal commitment was 1.31 on a 6-point scale (1=strongly disagree, 6=strongly agree).

On a 5-point scale (1=never, 5=always), the mean scores for utilization of selected instructional materials ranged from 2.76 for visual materials (slides, video tapes) on international agriculture to 1.50 for student activities on global perspectives (Table 2). On a scale of 1 to 6 with 1 being "of little importance" and 6 being "highly important", teachers rated text/reference books as a highly important source for obtaining information about international agriculture with a mean score of 4.0. Mass media, curriculum material services and individual contact with other teachers received a mean score rating of 3.9 as a highly important source of information for international agriculture (Table 3).

It is interesting to note that many teachers rated the Cooperative Extension Service (mean=3.7) above their State Department of Education (mean=3.6) and National Task Force on International Agriculture (Mean 3.0) as a "highly important" source of information for international agriculture.

Exploration of Relationships Between Variables Low positive relationships, significant at .05 level, were found between extent of integration and the number of years teachers taught agriculture (r=.15), age of teacher (r=.11), and level of formal education (r=.17). School location was unrelated with the extent of integration of international concepts.

Examination of the relationships between teachers knowledge of international concepts and the extent of integration revealed that only the knowledge of food consumed in other countries was related with the dependent variable (r=.12) at a low level. A low positive relationship was also found between cultural awareness and extent of integration (r=.23). Other international experience variables: participation in an internationalization workshop and international travel were not related to the extent of integration.

Table 2
Resources on International Agriculture Used by Agricultural Teachers

Resources Utilized*	n	Mean	S.D
Basic curriculum guide	220	2.00	1.00
Student activities	220	1.50	.91
Resource people	220	2.67	1.00
Visual materials	220	2.76	1.00

* Measured on a 5-point scale. 1=never, 2=rarely, 3=sometimes, 4=frequently, 5=always.

Table 3
Sources of Information About International Agriculture Used By Agricultural Teachers

Information Sources on International Agriculture.*	n	Mean	S.D
Text/Reference Books.	219	4.0	1.15
In-service Workshop.	220	4.0	1.40
Mass Media.	220	3.9	1.13
Curriculum Material Services.	219	3.9	1.28
Other Teachers.	220	3.9	1.31
Cooperative Extension.	220	3.7	1.26
State Dept. of Education.	220	3.6	1.38
Agriculture Expt. Station.	220	3.3	1.34
National Task Force on International Agriculture.	220	3.0	1.36

* Measured on a scale of 1 to 6, with 1 being "of little importance" and 6 being "highly important"

The relationships between extent of integration and work-related variables were examined. Significant but low positive relationships were found between the extent of integration of international concepts and the attitude of teachers (r=.27), teacher commitment (r=.14), perceived state department of education commitment (r=.11), and perceived school commitment (r=.29). There was no significant relationship between extent of integration and principal commitment.

Teachers with greater extent of integration of international concepts tended to use the following sources of information: Cooperative Extension Service (Tau=.15), mass media (Tau=.24), text and reference books

(Tau=.17), curriculum material services (Tau=.23), and personal contact with other teachers (Tau=.24). Other sources of information: agricultural experiment station, state department of education, in-service workshops and National Task Force on International Agriculture were unrelated to the extent of integration of international concepts. Teachers with greater extent of integration of international concepts tended to utilize the following instructional resource materials in teaching their agriculture classes: basic curriculum guides on international dimensions (Tau=.25), student activities on global perspectives (Tau=.16), resource people (Tau=.32) and visual materials (films, video tapes) on international agriculture (Tau=.34).

Regression Analysis Semi-partial multiple regression analyses were used to determine the amount of variance explained in the extent of integration score by the three sets of independent variables. The three demographic variables, the two international experience variables, and the thirteen work-related variables that were significantly related to the extent of integration comprised the variable sets. Table 4 indicates that only the demographic and work-related variable sets explained a unique portion of variance in the dependent variable. The total R^2 was .40.

Table 4
Semi-Partial Multiple Regression Coefficients the for Variable Sets

Variable Sets	K_A	K_B	sR^2	F
Demographic Variables	15	3	.024	2.67*
International Experience	16	2	.014	2.35
Work-Related Variables	5	13	.279	7.12**

R^2 =.40, *p<.05, **p<.001, (df 18, 199). K_A = # of variables controlled.
K_B = # of variables in the set.

CONCLUSIONS AND RECOMMENDATIONS

In addition to the quantitative data many teachers provided comments, both positive and negative, about internationalizing the curriculum. Some teachers felt that a better job of preparing students with non-agricultural backgrounds for agricultural jobs should have a priority over internationalizing the curriculum. Others felt that the current curriculum was already too packed with material to add something additional. The nature of favorable comments was that internationalizing the curriculum would assist in expanding the base of interested students, in assisting future agriculturalists in expanding agricultural exports, and in preparing students for global careers.

Findings of this research were generally consistent with previous research on the adoption of innovations. However, there was one notable exception. Older teachers were more likely to adopt the internationalization of their curricula than were younger teachers. It may be that awareness of and interest in global agriculture increases with age

to the extent that the older and more experienced teachers are more apt to work this new area of study into their curricula.

Teachers perceiving strong state department of education support for internationalizing the curriculum were more likely to adopt this curriculum change. It appears that state department continue to have a strong influence on the curriculum and can influence innovation with necessary leadership activates. Such leadership activities might include in-service education, instructional materials, and suggestions for changes in curriculum priorities.

Having positive attitudes towards the integration of international concepts may predispose the extent to which teachers integrate international agricultural dimensions in their classes. It appears that agricultural teachers who exhibit higher degrees of cultural awareness would be more likely to internationalize their agricultural instructions. Conversely, teachers who lack awareness of other peoples' culture may not be interested or even resist internationalizing their instruction.

Based upon the findings of this research, the following variables appears to be the most significant factors contributing to the extent of integration of international concepts: utilizing visual materials (slides, video tapes) on international agriculture, attitude towards integrating international concepts, utilizing basic international agriculture curriculum guides, mass media as most important source of information, and level of formal education.

Further research is recommended to develop and test curriculum materials, prioritize the possible curriculum content, establish data about the need for a global dimension in agricultural occupations, and determine the interest and knowledge of agricultural students about international concepts.

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FACTORS RELATED TO THE INTEGRATION OF INTERNATIONAL AGRICULTURAL CONCEPTS INTO THE SECONDARY AGRICULTURAL EDUCATION CURRICULUM

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This paper provides a well-developed theoretical framework in an area of agricultural education which has relatively recently emerged as a priority within agricultural education. The authors make a compelling case for conducting this study. They are to be applauded for bringing this work to our attention.

Strengths

An interesting aspect of this study is that it is regional in scope, covering twelve North Central states. The method used to determine sample size from among those states is not as explicit as it might be, but it appears to have been properly calculated and selected from the region.

The authors also deserve commendation for interviewing a 15 percent random sample of non-respondents. From their report this was done well, and generalizability of the findings to the population is a reasonable claim.

Concerns/Suggestions for Improvement

Research procedures and data analyses employed in this study are sound, but I became rather disoriented when I got into the conclusions and recommendations section. In particular, the authors indicate that teachers who perceive strong state department of education support for internationalizing the curriculum were more likely to adopt this curriculum change. However, in rereading various sections of the paper it is far from clear that there is evidence to support this claim. For example, the correlation between extent of integration of international concepts and the perceived state department of education commitment to such concepts was very low ($r = .11$). Further, in the ranking of sources of information about international agriculture used by teachers studied, state department of education ranked seventh among nine sources. A common hazard in interpreting correlational studies which have consistently low r-values is that authors often engage in "wishful thinking" about what they believe is or should be the case.

Further research is clearly needed in this area, and the authors have provided an excellent base for launching productive new lines of inquiry.

PERCEPTIONS OF STATE VOCATIONAL EDUCATION ADMINISTRATORS RELEVANT TO AGRICULTURAL EDUCATION IN THE MIDDLE GRADES

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Introduction

Early adolescence is the life stage from about 10 to 14 years of age and is characterized by many changes resulting from the physical, psychological, social, cognitive and vocational developmental processes. Because of these changes, the early adolescent has unique educational needs for which middle-grade (grades six through eight) schools were established.

The number of agriculture and other career-oriented education programs has increased at the middle-grade level in recent years (Alexander & McEwin, 1989). However, career-oriented curricula have been criticized for not meeting the educational needs of the middle-grade student (Beane, 1990; Harrington-Lueker, 1990). The continued development of career-oriented programs at the middle-grade level greatly depends upon the effectiveness of the programs and the support of state-level education officials.

Theoretical Framework

Eichhorn (1966) defined early adolescence as

> ...the stage of development which begins prior to the onset of puberty and extends through the early stages of adolescence. Since puberty does not occur for all precisely at the same chronological age in human development, the [early adolescent] designation is based on the many physical, social, emotional, and intellectual changes in body chemistry that appear prior to the puberty cycle to the time in which the body gains a practical degree of stabilization over these complex pubescent changes (p. 3).

Physically, the early adolescent experiences rapid growth associated with puberty. However, brain growth may not correspond with other physical developments. Between the ages of 12 and 14, there appears to be a period of slow brain growth that may disrupt the intellectual development of early adolescents (Epstein & Topfer, 1978; National Middle School Association, 1992).

Psychologically, the early adolescent commonly experiences increased anxieties related to physical appearance, school performance, death, religion, and peer relationships. The development of a positive self-concept and a high level of self-esteem are critical for the psychological well-being of early adolescents. Early adolescents "try on" various roles and personalities to determine which is best suited (Erikson, 1980). According to Erikson, the overriding influence on youth developing a strong sense of identity is the development of a clear path toward a vocational role.

Socially, peer relations play an increasingly important role in the lives of early adolescents. A primary social goal of early adolescents is to learn how to achieve recognition and esteem from peers (McEwin & Thomason, 1989). Despite the importance of peers, parents continue to exert strong influence on early adolescents, particularly on future-related issues such as religion, political beliefs, and career plans (Otto, 1988).

Cognitively, most early adolescents are progressing from the concrete to the formal stage of cognitive development. Increasingly sophisticated analytical abilities and abstract thought processes emerge as early adolescents advance from the concrete to the formal stage.

Vocationally, early adolescents are beginning to formulate career interests and goals. Early adolescents need to participate in activities that help them begin the occupational selection process (McEwin & Thomason, 1989). According to Miller (1988),

> ...research indicates a need for all students in the middle school to be presented with a broader range of occupations in our society. After all, it is unlikely that a student could realistically set as a goal an occupation to which he or she has not been personally exposed (p. 176-177).

Changes associated with the early adolescence period have numerous implications for middle-grade education. Middle-grade schools should help students develop both the large and small muscles through individualized physical education activities (Curtiss & Bidwell, 1977). However, because much anxiety is associated with physical development, middle-grade schools should not emphasize physical standards that can only be attained by the physically talented (Eichhorn, 1966). Related to psychological development, Steffans (1990) stated that a primary mission of middle-grade education is to develop a positive self-concept within students. Lipsitz (1984) indicated that an important task of the middle-grade school is to help students develop social skills.

To promote higher levels of cognitive ability, the middle-grade curriculum should give adequate attention to concrete learning experiences through demonstrations and hands-on activities while moving toward the abstract (Curtiss & Bidwell, 1977; McEwin & Thomason, 1989). Early adolescents need to acquire commonly used practical skills and develop a set of personal values (Curtiss & Bidwell, 1977; Greenberg & Hunter, 1982).

To promote vocational development, the middle-grade curriculum should provide early adolescents an understanding of various career roles in society (Carnegie Council on Adolescent Development); however, Sale (1979) emphasized that job training is not an appropriate function of the curriculum. Although career-oriented concepts are often taught in specific courses, recent recommendations for education reform emphasize the need for incorporating the concepts throughout the curriculum as a means of strengthening the connection between education and work (Secretary's Commission on Achieving Necessary Skills, 1991).

Student organizations play an important role in early adolescent education. Middle-grade student organizations provide means of extending the curriculum, exploring personal and career interests, and developing social and leadership skills (Kindred et al., 1976; Miller, 1988). Because of wide variations in the developmental levels among early adolescents, it has been recommended that participation take precedence over competition in the middle grades (Brazee & Smalley, 1982). Rossetti, Padilla, and McCaslin (1992) recommended that the National FFA Organization not develop competitive activities at the national level for middle-grade members. However, George (1988) pointed out that there are benefits of competition among students in the middle grades.

To be most effective, middle-grade schools should be staffed with faculty who are experts at teaching early adolescents. The faculty should be prepared to teach at the middle-grade level through specific pre-service and in-service activities (Sale, 1979; Carnegie Council on Adolescent Development, 1989).

Beliefs of administrators within an educational organization influence decisions affecting the programs and philosophy of that organization (Boyle, 1981). Essential to developing and improving agricultural education and other career-oriented programs at the middle-grade level was information on the current status of the programs and knowledge of how the programs are perceived and supported by state education agency officials. However, this information was not available from states.

Purpose and Objectives

The research presented in this paper is part of a larger study designed to determine the status of career-oriented education programs at the middle-grade level and the relevant perceptions of state education agency officials who have responsibilities in eight program areas. Objectives that guided the reported research were:

1. to describe middle-grade agricultural education in terms of: a) prevalence of programs, b) enrollment, c) nature of the courses, and d) teacher certification requirements; and
2. to determine the perceptions of state directors of vocational education and head state supervisors of agricultural education regarding: a) past and future growth of agricultural education and other career-oriented programs at the middle-grade level; b) the role of career-oriented education at the middle-grade level; c) the role of vocational student organizations (VSOs) at the middle-grade level; d) the degree to which career-oriented education can contribute to the vocational, values, intellectual, and social development of early adolescents; e) appropriate courses for delivering career-oriented concepts; and f) competition within middle-grade VSOs.

Procedures

Descriptive-survey research methodology was used in this study. A census of state directors of vocational education (N=50) and head state supervisors of agricultural education (N=50) was conducted to accomplish the objectives. Through mailed questionnaires specific to the populations, the study participants described policies of their states and indicated their perceptions and opinions regarding various aspects of career-oriented education at the middle-grade level. The questionnaire consisted of close-ended and partially close-ended items. Nine of the items were measured on a six-point Likert-type scale (1=strongly disagree, 2=disagree, 3=somewhat disagree, 4=somewhat agree, 5=agree, 6=strongly agree).

Instrument validity was assured through a field test. Reliability was determined by a test/retest procedure. The overall percentage of agreement on the test/retest was .93 and ranged from .66 to 1.00 on individual items.

After follow-up mailings to nonrespondents, 43 (86%) directors and 45 (90%) supervisors returned their questionnaires. Non-response error was accounted for by comparing respondents and nonrespondents contacted by phone on selected questionnaire items. A t-test indicated no statistically significant differences at alpha .05. Therefore, the responses received were generalized to the populations.

Results

The majority of supervisors reported that middle-grade students in their states were enrolled in agricultural education programs, and that most of the programs were aimed at career exploration and/or developing practical skills. However, only 12 (27%) supervisors provided enrollment data. Seventy percent of those supervisors from states offering middle-grade agriculture programs indicated that the teachers in those programs must hold a non-grade specific vocational teaching certificate; 16% indicated that the teachers must hold middle-grade certification.

A majority of supervisors reported that the number of middle-grade agriculture programs in their states increased over the past 10 years. Almost one-half of the directors reported that the overall number of middle-grade career-oriented programs increased over the past 10 years. A majority of supervisors and directors believed that those numbers will continue to increase over the next 10 years (Table 1).

Roles of middle-grade career-oriented programs identified by most supervisors and directors included: a) providing students with opportunities for career exploration, b) helping students assess their

occupational aptitude, c) providing students with opportunities to explore personal interests, d) providing students with hands-on applications of knowledge, and e) guiding students toward a high school vocational curriculum. Most supervisors indicated that the role should include providing students with opportunities to acquire practical skills (Table 2).

Roles of middle-grade VSOs identified by a majority of supervisors included: a) developing student leadership skills, b) providing students with opportunities to explore personal interests, c) developing student social skills, and d) providing instruction beyond the classroom. Almost one-half of the supervisors indicated that the role should include recruiting students into a high school vocational curriculum. Most directors indicated that the role of middle-grade VSOs should include helping students develop leadership and social skills. Almost one-half of the directors reported that the organizations should provide students with opportunities to explore personal interests (Table 3).

Mean scores on a Likert-type scale indicated the perceptions of supervisors and directors regarding various aspects of middle-grade career-oriented education. As a whole, the supervisors and directors agreed that career-oriented programs at the middle-grade level can: a) provide students with an understanding of the world of work; b) promote the social, intellectual, and vocational development of students; and c) promote the development of a personal value system within students. The supervisors and directors also agreed with the notion of career-oriented concepts being incorporated into middle-grade core courses (language arts, history, science, social studies, mathematics). The supervisors and directors tended to somewhat agree that career-oriented concepts should be taught in courses specifically designed for delivering the concepts, and that team competition should be an important part of middle-grade VSOs. The supervisors somewhat agreed and the directors somewhat disagreed that individual competition should be an important part of middle-grade VSOs (Table 4).

Table 1

Past and Future Growth Trends of Middle-grade Career-oriented Education

	Respondent Group			
	Directors		Supervisors	
Response	f	%	f	%
Past 10 years[a]:				
Increase	19	50	19	63
Same	7	18	8	27
Decrease	7	18	3	10
Not sure	5	14	0	0
Next 10 years[b]:				
Increase	25	62	28	65
Same	7	18	7	16
Decrease	4	10	3	7
Not sure	4	10	5	12

[a]Includes only those directors and supervisors who responded to the questionnaire item and who reported that middle-grade students were enrolled in states or program areas (n=38 directors, 25 supervisors).
[b]Includes all directors and supervisors responding to the questionnaire item.

Table 2

Roles of Middle-grade Career-oriented Education Programs[a]

Role	Respondent Group			
	Directors		Supervisors	
	f	%	f	%
Provide career exploration	39	100	41	91
Provide exploration of personal interests	36	92	36	80
Help students assess occupational aptitude	34	87	36	80
Provide hands-on application of knowledge	26	67	27	60
Guide students toward vocational curriculum	20	51	26	58
Provide practical skills	14	36	23	51
Guide students toward particular occupation	14	36	16	35
Provide job skills training	2	5	4	9
Should have no role	0	0	0	0
Other	2	5	1	2

[a]Includes valid responses only. Individuals not responding to questionnaire item are not included in the calculations.

Table 3

Roles of Middle-grade Vocational Student Organizations[a]

Role	Respondent Group			
	Directors		Supervisors	
	f	%	f	%
Develop student leadership skills	29	76	37	82
Develop student social skills	25	66	32	71
Provide exploration of personal interests	19	50	33	73
Provide instruction beyond the classroom	17	45	23	51
Recruit students into high school vocational education program	10	26	22	49
Should have no role	8	21	6	13
Other	2	5	1	2

[a]Includes valid responses only. Individuals not responding to questionnaire item are not included in the calculations.

Table 4

Director and Supervisor Perceptions Regarding Aspects of Career-oriented Education in the Middle Grades

Statement	Respondent Group	
	Directors	Supervisors
Career-oriented courses can help middle-grade students understand the world of work.	5.31 (1.15)	5.27 (.75)
Career-oriented courses can help middle-grade students develop their personal values.	5.03 (.93)	4.91 (.87)
Career-oriented courses can contribute to the intellectual development of middle-grade students.	5.00 (1.12)	5.16 (.74)
Career-oriented courses can contribute to the social development of middle-grade students.	5.00 (.95)	5.00 (.81)
Career-oriented courses can contribute to the vocational development of middle-grade students.	4.95 (1.12)	5.00 (.95)
The concepts of career-oriented education should be incorporated into middle-grade core courses.	4.74 (1.25)	4.98 (1.03)
The concepts of career-oriented education should be taught in career-oriented courses.	4.41 (1.42)	4.35 (1.36)
Team competition should be an important part of middle-grade vocational student organizations.	4.05 (1.54)	4.16 (1.59)
Individual competition should be an important part of middle-grade vocational student organizations.	2.90 (1.50)	3.53 (1.46)

Note: Standard deviation is in parentheses below corresponding mean.
Scale:
1=strongly disagree 4=somewhat agree
2=disagree 5=agree
3=somewhat disagree 6=strongly agree

Conclusions

Most states offer agricultural education programs at the middle-grade level; however, very little enrollment data are available on these programs. The programs are aimed primarily at career exploration and the development of practical skills. Rarely are teachers in the programs required to be certified specifically in middle-grade education.

In most states, the number of agriculture programs, and career-oriented education programs in general, has remained the same or increased over the past 10 years; this trend is likely to continue. Directors and supervisors view the role of career-oriented education at the middle-grade level as providing middle-grade students with opportunities for: a) exploring careers and personal interests, b) assessing occupational aptitudes, and c) applying knowledge through hands-on activities. Directors and supervisors view the role of middle-grade VSOs as the development of student leadership and social skills. Most supervisors

believe that the VSOs should also provide students with opportunities to explore personal interests.

The supervisors and directors perceive career-oriented programs as benefitting early adolescents in their vocational, intellectual, and social development. They also believe that the programs can help early adolescents develop a personal values system.

Directors and supervisors are supportive of career-oriented concepts being incorporated into middle-grade core courses as well as being taught in courses specifically designed for delivering the concepts. While not fully supportive of either type of competition in middle-grade VSOs, the directors and supervisors are more favorable toward team than individual competition.

Implications and Recommendations

The results of this study support the findings of Alexander and McEwin (1989) that the number of agricultural education and other career-oriented programs has increased at the middle-grade level in recent years. A continued increase in the number of agriculture programs indicates the need for more individuals to be prepared to teach agriculture at the middle-grade level. A continued increase in the number of programs also indicates the need to develop appropriate agricultural curriculum materials and student activities for early adolescents.

Vocational teacher educators should be knowledgeable of practices and philosophies that guide early adolescent education and incorporate related instruction into existing courses. Teacher educators, state supervisors, and other individuals having responsibilities for professional development activities should provide in-service programs related to early adolescent education to practicing middle-grade teachers and to those who may assume the role of teaching at that level. Through in-service and supervisory activities, state supervisors should ensure that middle-grade programs are effectively meeting the needs of early adolescents and are congruent with goals and philosophies of middle-grade education.

The early adolescent period has been recognized as a distinct life stage characterized by unique educational needs and developmental characteristics inherent with the onset of puberty. Therefore, the middle grades should be recognized as an educational phase requiring specific and unique qualities and competencies of teachers. As recognized by Sale (1979) and the Carnegie Council on Adolescent Development (1989), these qualities and competencies should be ensured through pre-service and in-service programs and teacher certification in middle-grade education. However, based on the results of this study, required middle-grade certification for career-oriented teachers is uncommon. States should consider establishing certification requirements for teachers in middle-grade career-oriented program areas.

The apparent lack of middle-grade program enrollment data available to supervisors indicates a need for improving (or in many cases implementing) data collection procedures for the programs. State vocational education agencies should encourage establishment of these procedures.

Based on the perceptions of the directors and supervisors, career-oriented education can help meet many of the educational and developmental needs of early adolescents that have been described in the literature (Kindred et al., 1976; Curtiss & Bidwell, 1977; Sale, 1979; Greenberg & Hunter, 1982; Lipsitz, 1984; Carnegie Council on Adolescent Development, 1989). However, the view expressed by many directors and supervisors that the roles of programs and VSOs should include guiding or recruiting students into a particular high school curriculum is not supported in the literature and has been criticized as a goal of middle-grade education. Career-oriented programs in middle-grade schools should be supported for the benefits provided early adolescents, not for the potential the programs have for recruiting students into vocational education at the high school level.

Congruent with recommendations of the Secretary's Commission on Achieving Necessary Skills (1991), directors and supervisors support incorporating career-oriented concepts into middle-grade core courses. Support for incorporating the concepts into core courses and for teaching the concepts in specific courses indicates a need for curriculum materials that can be utilized by core teachers and for materials specific to career-oriented courses.

Views expressed by the directors and supervisors and in the related literature (Brazee & Smalley, 1982; Rossetti et al., 1992) regarding competitive activities at the middle-grade level should guide agricultural educators and FFA organization leaders as they plan programs for early adolescents. Based on the literature and opinions of the respondents, competition should not be a primary focus of middle-grade VSOs. However, if competition is utilized, state supervisors and leaders of student organizations should develop activities and reward systems that are appropriate for early adolescents.

Directors and supervisors are generally in agreement on issues related to career-oriented programs at the middle-grade level. In order to continue the development of programs that are effective and appropriate for early adolescents, state-level vocational education administrators must be unified in their efforts. The base of these efforts is apparently in place as indicated by the similar perceptions and opinions expressed by the respondent groups.

The support of state directors and supervisors for middle-grade career-oriented programs bodes well for the future of the programs. Educators should use the information provided by this study as evidence of support for the programs at the state level and as a means of securing support at the local level.

Because career-oriented programs in the middle grades is a relatively new concept, much research and philosophical thought are needed to guide the development of the programs. Educators need sound information on which to make decisions regarding middle-grade educational practices. Continued research efforts in this area are essential to providing programs that effectively meet the needs of early adolescents.

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PERCEPTIONS OF STATE VOCATIONAL EDUCATION ADMINISTRATORS RELEVANT TO AGRICULTURAL EDUCATION IN THE MIDDLE GRADES

A Critique

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This paper is well developed in its attention to various developmental needs of early adolescents. It addresses an area of growing concern in many states in recent years and by strong implication suggests a view by which we may pursue agricultural education at the middle grade levels. The authors emphasize that this study was focused on "career oriented" education programs.

Strengths

Among the other strengths of this study is a set of research procedures which are generally sound and worthy of replication in future studies. Return rates from the populations studied were respectable, and non-response error was minimized through solid follow-up procedures.

Concerns/Suggestions for Improvement

In the procedures section the authors state that "Instrument validity was assured through a field test." We may accept this claim on faith or we may question it because of the lack of further information on instrument validity. Typically, steps to assure instrument validity prior to the field test stage are commonly expected, as well as some discussion of what occurred during field test to identify instrumentation problems and needed corrections. Such information is lacking from the paper.

My major concern has to do with what seems to be more of an implicit conceptual framework for the study, which was given very limited attention in the section of the paper focusing upon literature review. That is, the "career-oriented" focus of the study is clearly connected to the respondents' desires to guide more students into a high school vocational curriculum following their agricultural education studies in the middle grades. The tone of this paper seemed to be that of extending vocationalism, the "vocational model," to the middle grade level, virtually ignoring more recent and I think more compelling calls for expanding agricultural literacy at the middle and lower grade levels. Perhaps we should expand our investigations to other groups in the search for a more encompassing vision of what middle grade students need to learn and how they should best learn it for their own development and that of society.

PRESERVICE ELEMENTARY EDUCATION MAJORS KNOWLEDGE OF AGRICULTURE

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Introduction

In 1988, the National Research Council published a document entitled Understanding Agriculture: New Directions for Education. The Council sought to pull together concerns and research to address issues of declining agricultural profitability; international competitiveness; and enrollments, instructional content, and quality of U.S. agricultural education programs. Coupled with these concerns were issues that dealt with the declining level of knowledge about and a growing negative attitude towards agriculture by our society. From these issues the committee developed the idea of "agricultural literacy-the goal of education about agriculture" (p.8).

Recommendations by the National Research Council (1988) included the statement that "all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (p.10). Stewart (1989) expanded this statement by suggesting to encompass the adult population. Further recommendations involved the incorporation of agriculturally related information into existing curricula, thereby reducing the need for a separate class. Williams and White (1991) pointed out that if agricultural educators expected our nation's youth to understand American agriculture, information related to agriculture must be "included in the day to day curriculum" (p. 10.). Furthermore, the National Research Council (1988) recommended encouraging teachers to modify their lesson plans to incorporate materials about scientific, economic, and public health aspects of agriculture and related topics.

With these statements in mind, one key player in this issue of agricultural literacy and adopting and following through with the recommendations of the Council is the teacher. Dewey (1904/1965) contended that at best, teachers observe and direct the mental life of the learner. Buchmann (1983) stated that "knowledge is what teaching is about. For teachers to act in a way that does justice to this intrinsic connection, they need to have content knowledge" (p. 3).

Peters (1977), in discussing the priority of content in teacher preparation stated that the process of preparing to become a teacher requires that priority be given to content. Peters equated the lack of a thorough grounding in content to an actor that is skilled in gesture, audience control, and voice; yet has omitted one vital thing-to learn, the script. Buchmann (1983) supported Peter's perspective by adding that "part of the meaning of teaching is an understanding of what is to be taught. It would be odd to expect a teacher to plan a lesson on, for instance, writing reports in science and to evaluate related student assignments, while admitting that the teacher is ignorant about writing as well as science" (p.5).

Similar studies in the areas of world geography, American history, American government, and economics (McKinney, 1988; Ford, 1988; and Gilmore, 1988) added further support to the argument that teachers with limited content knowledge effect classroom practice. Conant (1963) stated that "if a teacher is largely ignorant or uniformed he can do much harm" (p.93). Both Dewey (1902) and Hawkins (1974) suggested that a teacher's ability to hear children is enhanced through a firmer grasp of content knowledge.

Purpose and Objectives

The purpose of the study was to assess the level of knowledge about and perceptions toward agriculture in the U.S. of preservice elementary education majors at the University of Missouri-Columbia. More specifically, the objectives of this study were: a. to determine the level of knowledge about agriculture held by preservice elementary education majors. b. to determine the perceptions toward agriculture held by preservice elementary education majors. c. to identify relationships between knowledge and perception scores and selected descriptive variables.

Procedures

A survey instrument comprised of three sections was developed for a larger study. A version of this instrument was adapted specifically for this study. The original instrument was developed using Frick's (1989) delphi study as its basis.

The responses of the group using the instrument were subjected to item analysis. Based on this process, 21 items were used for analysis from the knowledge scale and 21 items were used from the perception scale. The instrument was checked for validity by the agricultural literacy project panel involving professionals from 4 institutions.
Procedures used to estimate the instrument's reliability were the Kuder-Richardson 20 for section 1 (knowledge about agriculture with a true/false/don't know format) and Cronbach's Alpha for section 2 (perception towards agriculture with a 5-point Likert-type scale). The estimate of reliability for the revised instrument (21 items) used in this

study was .76 for the knowledge section and .86 for the perception section.

This study involved the collection of responses about Agricultural Awareness of preservice elementary education majors at the University of Missouri-Columbia. The sample included 82 preservice elementary education majors at the University of Missouri-Columbia completing their student teaching during the winter semester of 1992. A total of 65 preservice elementary education majors responded. This represented a usable response rate of 79% of the subjects surveyed.

In order to determine if a non-response bias existed, analysis of variance (ANOVA) was utilized to compare early and late respondents. Since the ANOVA yielded an F value of .55 with a probability of 0.46 for the knowledge section and an F value of .94 with a probability of 0.33 for the perception section, it was concluded that no statistically significant difference ($p<.05$) existed between early and late respondents.

Results

The first objective was designed to determine the level of knowledge about agriculture held by preservice elementary education majors. The mean for the knowledge section for the preservice elementary education group was 16.96 (range 0-21) with a standard deviation of 3.26 (see Table 1).

Table 1
Means and Standard Deviations for the Preservice Elementary Education Majors Knowledge and Perception Scores (N=65)

Variable	Mean	Standard deviation
Knowledge	16.96	3.26
Perception	47.78	9.28

The second objective was designed to determine the perceptions of preservice elementary education majors toward agriculture. Lower values were assigned to the more positive response. Therefore, more positive perceptions toward agriculture resulted in a lower score on this section. The scale was reversed when items were deemed negative towards agriculture in order to remain consistent with the project staff's theory of a lower score equals a more positive perception. The mean perception score for the preservice elementary education majors was 47.78 (range 21-105) with a standard deviation of 9.28 (Table 1).

Additional correlations were calculated for the data. A significant relationship (r=-.27) existed between knowledge and perception. Based on the design of the perception scale, those individuals with lower perception scores reflected a

more positive perception towards agriculture. Another relationship was related to the respondents confidence in teaching agricultural topics in the classroom. There was a significant correlation between confidence in teaching agricultural concepts and agricultural experience (r=.24), having parents or grandparents that either work on a farm or work in an agricultural business (r=.30), and having worked at a job on the farm or an agricultural off farm job (r=.45). (Table 2).

Table 2
Pearson Correlations Among Variables (N=65)

Variable	2	3	4	5	6	7	8	9	10	11
1 Knowledge	-.27	-.22	-.16	-.23	-.04	-.24	-.06	-.00	-.02	-.17
2 Perception	.	.02	.04	.08	.19	-.10	-.21	-.18	-.10	.12
3 Home locale		.	.38	.30	.32	.56	.14	.04	-.10	.22
4 Exp. animals/crops			.	.28	.34	.18	.15	-.01	-.13	.24
5 Relatives on farm				.	.33	.23	.22	-.07	-.03	.30
6 Work in ag.					.	.20	.12	.08	.06	.45
7 HS offer ag.						.	.13	.12	.20	.13
8 Member of 4-H							.	-.11	-.01	.13
9 Wks. st. tch.								.	.08	-.19
10 Cr.hrs.bio.sci.									.	-.10
11 Confidence ag.										.

Variables with correlations >.24 were significantly correlated at ≤.05 level.

Conclusions and Recommendations

The following conclusions were based on the findings of this study:

1. The overall mean level of knowledge about agriculture held by preservice elementary education majors is high but varies widely.
2. The overall mean level of perceptions toward agriculture held by preservice elementary education majors is positive but varies widely.
3. Elementary education student teachers with higher knowledge scores tend to have more positive perceptions toward agriculture.
4. Elementary education student teachers with agricultural experience are more confident about teaching science topics related to agriculture.

Significant correlations existed between those variables related to agricultural experience and the respondents confidence to teach agriculturally related topics. Unfortunately, the largest percent of respondents were not confident to teach these concepts. With agricultural experience significantly related to confidence to teach, and evidence of those experiences waning, concern as to the

success rate of the presentation of the information about agriculture in the classroom becomes an issue. Teachers' own subject matter knowledge influences their own efforts to help students learn subject matter (Ball and McDiarmid, 1989). Furthermore, research has found that teachers often feel inadequate to present certain topics and often avoid them because of an inadequate background in the subject (Bethel and Hord, 1981).

The results of this study pose some interesting challenges to the profession of agricultural educators and education as a whole. If the old adage is true that "teachers tend to teach what they know", then agricultural educators have a challenge. Educating society about the importance of agriculture is vital. If educators are to incorporate agricultural information into existing curriculums and rely on individuals to teach these concepts successfully, then helping untrained, inexperienced teachers with this task should become a priority for agricultural education.

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PRESERVICE ELEMENTARY EDUCATION MAJORS' KNOWLEDGE OF AGRICULTURE

A Critique

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The authors of this paper provide an outstanding example of a clear, brief, yet well-documented theoretical framework from a diverse literature base. The case for determining the agricultural knowledge base and perceptions among future elementary school teachers is a worthy approach to the matter of how to achieve agricultural literacy among significantly greater numbers of school-age youth.

Strengths

The authors gave careful attention to sound instrument development procedures, adapting and improving upon one from previous research to fit the particular purposes of this study. It was particularly pleasing to see they had conducted item analyses to determine the most appropriate items to measure knowledge and perceptions.

The most interesting part of this paper for me was the data reported for Objective Three. These data suggest a need for future studies on other population groups, perhaps utilizing quasi-experimental studies to test alternative approaches to improving the knowledge and perceptions held by elementary teachers toward agriculture.

Concerns/Suggestions for Improvement

Discussions involving population and sample in this particular paper were confusing to me. At one point the paper indicated that the population studied was preservice elementary education majors at the University of Missouri-Columbia. Later the paper refers to a sample of 82 preservice elementary education majors. Neither the population in general nor sampling procedures in particular were described in this section. This needed to be clarified and elaborated. Also, no apparent effort was made to gather data from the 21 percent of non-respondents.

The discussion under Objective One needs to be expanded in this paper. For example, the mean score for the perception section of the instrument was not discussed. The meaning of scores on sections of the instrument should be explained to the readers, especially when a low score indicates a positive response. This section was generally confusing.

AN ASSESSMENT OF THE PERSONALITY STYLES OF PRESERVICE TEACHERS OF AGRICULTURE

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Introduction

Teachers are unique in many ways. Teachers have been found to vary from one another with regard to their learning styles, teaching styles, and personality styles (Myers & Myers, 1980; DeNovallis & Lawrence, 1983; Canfield & Canfield, 1976; Dunn & Dunn, 1979). A person's personality style has been most effectively assessed utilizing the Myers-Briggs Type Indicator (MBTI) (Myers & Myers, 1980). The MBTI research literature supports the associations among MBTI personality type profiles, learning styles, and approaches for teaching (Barrett, Sorensen, & Hartung, 1987; Lawrence, 1986; Myers & McCauley, 1985; Meisgeier & Murphy, 1987).

Myers and McCauley (1985) stated that consistent with personality type theory, the personality type profiles were related to three aspects of learning: aptitude, application, and interest. Dunn and Dunn (1979) further asserted that "teachers teach the way they learned" (p. 241). Thus, personality style's association with learning styles and teaching styles is supported.

Personality styles have been studied (Lawrence, 1984; Sugarman, 1985; Myers & Myers, 1980; Hoffman & Betkouski, 1981; Carlyn, 1976; Duch, 1982; DeNovellis & Lawrence, 1983) in several teacher education disciplines. Of importance to teacher educators in agriculture was the study by Barrett, Sorensen, and Hartung (1987).

Barrett, Sorensen, and Hartung (1987), using the MBTI, found that many college of agriculture students exhibited an "action" learning style which was in direct contrast with the teaching style of many agriculture professors. Barrett, Sorensen, and Hartung (1987) expressed concern that the agriculture professors might not realize the significance of the learning style differences of students and that students might drop out of college because they did not experience academic success.

The issue of learning style raises a related question: What role might other psychological characteristics play in how individuals respond to the environment? Horner and Barrett (Bargar, Bargar, & Clark, 1990) studied personality type profiles of adult farm couples using the MBTI. The findings from Horner and Barrett (Bargar, Bargar, & Clark, 1990) suggested that specific personality type profiles (ESTJ, ISTJ, ESFJ) were most often represented by individuals engaged in production agriculture.

Individuals with the selected personality type profiles (ESTJ, ISTJ, ESFJ) identified by Horner and Barrett (Bargar, Bargar, & Clark, 1990) seemed eminently suited for the demands of established production agriculture practices, but were likely to experience trauma brought about by career change (Bargar, Bargar, & Clark, 1990). Is it likely that college age students who aspire teaching careers in agriculture have personality type profiles similar to the adult farmers?

Despite the amount of related research regarding personality styles, teacher educators in agriculture may be unable to fully utilize the results. Preservice teachers of agriculture have not been included in the samples of the previous research. Thus, within agricultural education, a problem exists in that there is a paucity of research which identifies the personality type of preservice agriculture teachers.

Purpose and Objectives

The purpose of the study was to determine the personality type of preservice teachers enrolled in a methods of teaching agriculture course. To guide the study, the following research questions were investigated:

1. What were the MBTI personality type profiles of preservice teachers enrolled in a methods of teaching agriculture course?

2. How can preservice teachers enrolled in a methods of teaching agriculture course be described in regards to MBTI personality dimensions and functions?

Procedures

Population and Sample

The target population for the descriptive study was preservice teachers majoring in Agricultural Education at The Ohio State University. The accessible sample included 29 female and 53 male (n=82) preservice teachers enrolled in a methods of teaching agriculture course during the academic years 1990, 1991, and 1992. The results of the study were generalizable only to the accessible sample.

Instrumentation

The Myers Briggs Type Indicator (MBTI), Form G (Myers, 1977), was used to assess the personality type profiles of the preservice teachers. The MBTI is primarily concerned with the valuable differences in people that result from where people like to focus their attention, the way they like to take in information, the way they like to make decisions, and the kind of lifestyle they adopt (Myers & Myers, 1980).

The MBTI is based on Jung's theory about perception and judgment, and the attitudes in which perception and judgement are used by different types of people (Myers, 1962). The MBTI scales measure a preference for four dimensions: Extroversion (E) - Introversion (I), Sensing (S) - Intuition (N), Thinking (T) - Feeling (F), and Judging (J) - Perceiving (P). In combination, 16 personality type profiles are possible.

The EI dimension is designed to reflect whether a person is oriented primarily toward the outer world (E) or toward the inner world (I) of ideas. The SN dimension describes an interest in perceiving the objects, events, and details of the present moment (S) or the possibilities imagined in the future (N). The TF dimension describes a preference for making rational judgments by using logical analysis (T) or personal values (F). The JP dimension describes a preference for organizing and controlling events (J) or for observing and understanding such events (P).

The MBTI dimensions indicating the preferred style of perception, Sensing (S) or Intuition (N), and the preferred decision making style, Thinking (T) or Feeling (F), are collectively (SF, ST, NF, NT) called a function. The four functions (SF, ST, NF, NT) are associated with the way in which people learn (Myers & Myers, 1980).

The preferred learning mode of the ST function is being sensitive to the needs of the those around the learner and prefers useful and applied subject matter which is undergirded in theory with various possibilities for solution. The ST learner can best be described as a passive learner. The SF learner, like the ST learner, is sensitive and prefers useful and applied subject matter. However, the SF learner prefers to have harmony and consensus building in the learning environment and prefers to be given the answers rather than seeking out the answers. The SF learner can best be described as a status-quo learner.

The preferred learning mode of the NF function is that of being logical and analytical of the subject matter. In addition, the NF learner is a consensus builder and enjoys harmony in the classroom. The NF learner can be described as an active learner. The NT learner, also prefers a logical and analytical approach to learning. Furthermore, the NT learner dwells on theory and continually seeks various solutions to problems. The NT learner can best be described as a problem solver.

The MBTI has been described and validated through nearly 40 years of research. Split half reliability coefficients computed on continuous scores run between .80 and .92 across all four dimensions for groups aged 15 through 60 plus years (Myers & McCauley, 1985). Test-retest reliability coefficients have been estimated based on the percent of agreement between personality type profiles over time intervals from five weeks to six years. The test-retest coefficients run from .69 to .92 across all personality type profiles (Myers & McCauley, 1985).

Data Collection

The MBTI was administered during the academic years 1990, 1991, and 1992. The MBTI was administered by one of the researchers during class sessions of a methods of teaching agriculture course.

Analysis of Data

The MBTI was hand scored by one of the researchers. The aggregate data were analyzed by microcomputer utilizing the SPSS/PC$^+$ program.

Results

The preservice teachers in the methods of teaching agriculture course during the academic years 1990, 1991, and 1992, reflected all 16 personality type profiles measured by the MBTI (Table 1). The most common profiles were ESTJ (23.2%), ISTJ (18.3%), and ESFJ (13.4%). Nearly 55% of the preservice teachers had a profile of either ESTJ, ISTJ, or ESFJ. The least common profiles were ENFJ (1.2%), INFJ (1.2%), and ISFJ, INTJ, ISFP, and ENTP, which accounted for 2.4% each (Table 1).

Table 1

Rank Order of Frequency and Percent of MBTI Personality Type Profiles (n = 82)

Profile	f	Percent	Cumulative Percent
ESTJ	19	23.2	23.2
ISTJ	15	18.3	41.5
ESFJ	11	13.4	54.9
ESTP	5	6.1	61.0
ENFP	5	6.1	67.1
ESFP	4	4.9	72.0
ENTJ	4	4.9	76.9
ISTP	3	3.7	80.6
INFP	3	3.7	84.3
INTP	3	3.7	88.0
ISFJ	2	2.4	90.4
ISFP	2	2.4	92.8
INTJ	2	2.4	95.2
ENTP	2	2.4	97.6
INFJ	1	1.2	98.8
ENFJ	1	1.2	100.0
TOTAL	82	100.0	100.0

In regards to the Extroversion (E) - Introversion (I) dimension, approximately 62.2% of the preservice teachers were E, while 37.8% were I (Table 2). On the Sensing (S) - Intuition (N) dimension, 74.4% of the preservice teachers were S, while the remaining 25.6% were N. The Thinking (T) - Feeling (F) dimension was represented by 64.6% of the preservice teachers on the T preference and 35.4% on the F preference. On the Judging (J) - Perceiving (P) dimension, 67.1% of the preservice teachers were J, while 32.9% were P.

Table 2

Frequency and Percent of MBTI Dimensions (n = 82)

Dimension	f	Percent
Extroversion (E)	51	62.2
Introversion (I)	31	37.8
Sensing (S)	61	74.4
Intuition (N)	21	25.6
Thinking (T)	53	64.6
Feeling (F)	29	35.4
Judging (J)	55	67.1
Perception (P)	27	32.9

The MBTI function indicating preferred style of perception was obtained from the MBTI personality type profiles. The MBTI personality type profiles of the preservice teachers indicated that 51.2% preferred ST, 23.2% preferred SF, 13.4% preferred NT, and 12.2% preferred an NF style of perception (Table 3).

Table 3

Frequency and Percent of MBTI Functions Indicating Preferred Style of Perception (n = 82)

Function	f	Percent
Sensing - Thinking (ST)	42	51.2
Sensing - Feeling (SF)	19	23.2
Intuition - Thinking (NT)	11	13.4
Intuition - Feeling (NF)	10	12.2
TOTAL	82	100.0

Conclusions and/or Recommendations

The most common MBTI personality type profile categories of the preservice teachers enrolled in the methods of teaching agriculture course

for the past three years represent categories common to both adult and youth groups in agriculture. In addition, throughout the three years, all 16 MBTI personality type profile categories have been represented by the preservice teachers. The distribution of personality type profiles was consistent with those of agricultural groups in previous studies (Barrett, 1985; Barrett & Horner, 1987; Barrett, Sorensen & Hartung, 1987; McCann, Heird & Roberts, 1989; Bargar, Bargar & Clark, 1990). Although the majority of the students were ESTJ, ISTJ, or ESFJ, smaller numbers of the remaining MBTI personality type profile groups have been represented in the data.

Characteristics of ESTJ include being practical, realistic, matter-of-fact, and with a natural head for business or mechanics. ESTJ individuals are not interested in subjects which they see no use, but can apply themselves when necessary. Furthermore, individuals with an ESTJ personality type profile like to organize and run activities.

Characteristics of ISTJ include seriousness, quiet, and earn success by concentration and thoroughness. ISTJ individuals are practical, orderly, dependable, matter-of-fact, logical, and realistic. Individuals with an ISTJ personality type profile see to it that everything is well organized and make up their mind as to what should be accomplished and work toward it steadily, regardless of protests or distractors.

Characteristics of ESFJ include being warm-hearted, talkative, popular, conscientious, cooperative, and active committee members. ESFJ individuals need harmony and may be good at creating harmony. Individuals with an ESFJ personality type profile are always doing something nice for someone and work best with encouragement and praise. In addition, ESFJ individuals main interest is in things that directly and visibly affect people's lives.

The dimensions (EI, SN, TF, JP) data indicated that the majority of the preservice teachers were E (62.2%), S (74.4%), T (64.6%), and J (67.1%). The dimension of E indicates that a person is oriented towards the outer world. The S dimension indicates that individuals perceive objects, events, and details of the present moment. The T dimension describes a preference for making rational judgements by using rational analysis. The J dimension indicates a preference for organizing and controlling events.

The MBTI function (SF, ST, NF, NT) data indicated that the majority of the preservice teachers were ST (51.2%). ST people are mainly interested in the realities of a given situation. Reality for ST people is what can be observed, collected, and verified directly by the senses. Because the kind of judgment ST people trust is thinking, ST people make decisions by logical analysis, with a step-by-step process of reasoning from cause to effect, from premise to conclusion.

The preservice teachers of agriculture thus represent one of the present day concerns of agricultural educators, which might be characterized as a need to teach to a predominate population of traditional students as well as successfully responding to non-traditional

agriculture students whose learning styles, based on MBTI personality type profiles, may require somewhat different teaching approaches.

The data clearly suggests that teachers working with students will need to use teaching approaches effective with all of the learning preferences. The recommendation does not suggest that the teacher needs to prepare a separate lesson plan for each student, but it does suggest that each lesson could be more effective if each learning preference was considered as the lesson plan was being developed.

Meisgeier and Murphy (1987) stated that students "understand" when their learning style is accommodated, and will be more comfortable in the class that is planned and taught in a manner that clearly incorporates the learning styles of the students, therefore making the efforts of the teacher more effective. Addressing the variety of personality type profiles of the students should provide support for the student's own intrinsic motivation for and enhancement of his/her work (Deci and Ryan, 1990).

Although there has been recognition and support given to the associations between MBTI personality type profiles and learning style preferences of students, convenient classroom materials for use by teachers have not been developed. It is therefore recommended that a handbook based upon the MBTI personality type profile-related preferences be developed for use by preservice teachers of agriculture.

In addition, a relatively brief individual personality type preference checklist should be developed to use with the MBTI preference handbook. The individual personality type preference checklist should be developed in relation to the MBTI dimensions. The items selected by the respondents would further assist in determining the learning style preferences and provide valuable data for modifying teaching approaches, techniques, and methods. The ultimate benefit could be the improvement of learning by individuals or groups of students. At present there are no materials available comparable to the MBTI preference handbook or the individual personality type preference checklist recommended.

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AN ASSESSMENT OF THE PERSONALITY STYLES OF PRESERVICE TEACHERS OF AGRICULTURE

A Critique

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Cano and Garton studied, over a three-year period, the personality styles of preservice teachers of agriculture enrolled in an undergraduate agricultural teaching methods course. They used a standardized instrument (Myers-Brigs Type Indicator) to assess student preferences for four dimensions: Extroversion-Introversion, Sensing-Intuition, Thinking-Feeling, and Judging-Perceiving.

A strength of the study was that it focused on topics of current interest to educators. Are there relationships between personality styles and preferred learning mode of individuals? Would knowledge of preservice teachers learning styles assist teacher educators in providing enhanced preservice education? Should preservice methods of teaching agriculture courses be modified to provide additional instruction concerning the modification of teaching approaches, techniques, and methods to respond to the variance in learning styles of students? Cano and Garton included in their research a concise description of the characteristics of the major personality types of preservice teachers of agriculture that were the population for their study. The purpose of this descriptive study was simply to determine the personality type of preservice teachers enrolled in a methods of teaching agriculture course.

Some Questions:

1. Where there differences in personality styles between genders? If so, what are the implications?

2. Where there differences in personality styles among different groups of students? Again, if so, what are the implications?

3. From a practical standpoint; What specific changes should be made in preservice methods of teaching agriculture courses?

The authors are to be commended for providing some base-line information regarding personality styles of preservice teachers of agriculture. The have provided some valuable suggestions regarding the development of teaching materials and a handbook based upon personality type profile-related preferences for use by teachers of agriculture.

PRESERVICE TEACHERS' LEARNING STYLES AND THEIR RELATIONSHIP WITH PERFORMANCE IN A METHODS OF TEACHING AGRICULTURE COURSE

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Introduction

Researchers (Witkin, 1973; Gregorc, 1979; Garger & Guild, 1984) have suggested that learning style was an important factor in students' academic achievement, how students learn and teachers teach, and student-teacher interaction. Furthermore, Dunn and Dunn (1979) asserted that "teachers teach the way they learned" (p. 241), which has been supported by other researchers (Witkin, 1973; Gregorc, 1979; Avery, 1985). However, Koppleman (1980) suggested that investigations conducted on the relationship between a person's learning style and the manner in which he/she teaches were insufficient.

Learning style describes the manner in which learners sort and process information. The field-dependence/independence dimension has been the most extensively studied learning style and has produced the broadest applications to educational problems (Witkin, Moore, Goodenough, & Cox, 1977). In the field-dependence/independence learning style dimension, a person can be categorized as preferring either a field-dependent or field-independent learning style (Witkin, 1973).

Research (Witkin, 1973) has shown that a person whose mode of perception was strongly dominated by the surrounding field was said to be leaning toward a field-dependent learning style. Individuals with a field-dependent learning style tend to perceive the world globally, find it more difficult to solve problems (Ronning, McCurdy, & Ballinger, 1984), and find it more difficult to teach using a problem-solving approach (Witkin et al., 1977).

In contrast, a person who perceives items as more or less separate from the surrounding field is leaning more toward a field-independent learning style (Witkin, 1973). Field-independent learners view the world more analytically, find it easier to solve problems (Ronning, McCurdy, Ballinger, 1984), and more than likely teach using a problem-solving or inquiry approach (Witkin et al., 1977; Koppelman, 1980). Furthermore, persons leaning toward a field-independent learning style have shown an interest in teaching agriculture (Witkin et al., 1977). Canfield and Canfield (1976) noted that research regarding learning styles can serve as a basis for selecting teaching approaches.

The problem-solving approach has been promoted by the agricultural education profession as the teaching approach to use in teaching secondary

agriculture students (Martin, 1982; AAAE, Preparation of Professionals for Agricultural Education, 1991). Crunkilton (1988) stated that "...problem solving, both as a method of teaching and as a skill that students need, is more critical today than it was years ago" (p. 8). Teacher educators in agriculture have long advocated the use of the problem-solving approach to teaching (Stewart, 1950; Binkley & Tulloch, 1981; Crunkilton & Krebs, 1982; Newcomb, McCracken & Warmbrod, 1986; Phipps & Osborne, 1988). Furthermore, teacher educators across subject matter disciplines support teaching teachers how to teach using an inquiry-oriented (problem-solving) approach to teaching (ATE, Commission on the Education of Teachers, 1991).

However, Mosston (1972), in discussing problem-solving, stated that "problem solving as a teaching style requires problem solving as a learning style" (p 166). Consequently, with the emphasis placed on teaching utilizing the problem-solving approach, do all teachers of agriculture possess the characteristics to teach utilizing the problem-solving approach? Research is needed in the agricultural education profession that identifies the relationship which may exist between preservice teachers' preferred learning style and their ability to teach utilizing the problem-solving approach?

Purpose and Objectives

The purpose of the study was to determine the relationship between preservice agriculture teachers' preferred learning style and their performance in Methods of Teaching Agriculture, a course emphasizing the problem-solving approach to teaching. To guide the study, the following research questions were developed:

1. What was the preferred learning style of preservice teachers of agriculture as measured by the Group Embedded Figures Test?

2. What was the relationship between preservice teachers' preferred learning style and their performance in Methods of Teaching Agriculture?

Procedures

Population and Sample

The study was descriptive and relational in nature. The target population for the study was preservice teachers majoring in agricultural education at The Ohio State University. The accessible sample included 29 female and 53 male (n = 82) preservice teachers of agriculture enrolled in Methods of Teaching Agriculture during the academic years 1990, 1991, and 1992. Results of the study were generalizable only to the accessible sample.

Instrumentation

The Group Embedded Figures Test (GEFT) (Oltman, Raskin, & Witkin, 1971) was administered to determine the preferred learning style of the subjects as either field-dependent or field-independent. Subjects who scored greater than the national mean (11.4) (Witkin, Oltman, Raskin, &

Karp, 1971) were considered to be leaning toward the field-independent learning style while subjects scoring less than the national mean were considered to be leaning toward the field-dependent learning style. The GEFT is considered a standardized instrument and has been tested for validity and reliability (Spearman Brown Prophecy formula = .82) (Witkin, Oltman, Raskin, & Karp, 1971).

Data Collection

The GEFT was administered by one of the researchers during the university academic years 1990, 1991, and 1992. Preservice teachers' performance in Methods of Teaching Agriculture was measured utilizing two criteria: microteaching laboratory average score and final course score. The microteaching laboratory was conducted utilizing the problem-solving approach to teaching, as outlined by Newcomb, McCracken, and Warmbrod (1986). Preservice teachers were required to demonstrate the problem-solving approach to teaching during seven microteachings. Preservice teachers' final course score encompassed microteaching average score, quizzes given during the course, a complete unit plan, and final exam score, all of which were based on the problem-solving approach to teaching.

Analysis of Data

The GEFT was hand scored by one of the researchers. Microteaching lessons were evaluated and scored by the microteaching laboratory instructor. The microteaching evaluations were based on the preservice teachers' ability to demonstrate the problem-solving approach to teaching. In addition, preservice teachers' overall teaching performance was used as an evaluation criteria. The aggregate data were analyzed using the SPSS/PC$^+$ microcomputer statistical package. Pearson Product correlation coefficients were calculated between GEFT scores and performance in Methods of Teaching Agriculture and were interpreted utilizing Davis' (1971) descriptors.

Results

An analysis of the GEFT scores indicated that 41% (34) of the preservice teachers leaned toward the field-dependent learning style and 59% (48) leaned toward the field-independent learning style (Table 1). A gender analysis revealed that 45% (13) of the females preferred the field-dependent and 55% (16) preferred the field-independent learning style, while 40% (21) of the males preferred the field-dependent and 60% (32) the field-independent learning style. The mean score on the GEFT was 11.9 which exceeded the national norm of 11.4 (Witkin, Oltman, Raskin, & Karp, 1971). Furthermore, the preservice teachers' GEFT scores ranged from the minimum possible score of zero to the maximum possible score of 18, with a standard deviation of 4.6.

The second research objective sought to determine the relationship between preservice teachers' preferred learning style and performance in Methods of Teaching Agriculture. A low positive relationship (r = .20) was found between learning style and microteaching laboratory average score utilizing the problem-solving approach (Table 2). The results

suggested that the more field-independent a preservice teacher's learning style, the greater his/her score in microteaching utilizing the problem-solving approach to teaching.

Table 1

Preferred Learning Styles Of Preservice Teachers Of Agriculture (n=82)

Gender	Field-Dependence		Field-Independence	
	f	%	f	%
Females	13	44.8	16	55.2
Males	21	39.6	32	60.4
Total	34	41.5	48	58.5

Mean = 11.9
Std. Dev. = 4.6
Range = 0 - 18

Table 2

Relationship Between Learning Style And Microteaching Laboratory Average Score (n=82)

Microteaching Score	Field-Dependence		Field-Independence	
	f	%	f	%
72.0 - 75.9	2	5.9	0	0.0
76.0 - 79.9	3	8.8	1	2.1
80.0 - 83.9	3	8.8	4	8.3
84.0 - 87.9	11	32.4	14	29.2
88.0 - 91.9	9	26.5	16	33.3
92.0 - 95.9	6	17.6	13	27.1
Totals	34	100.0	48	100.0

Mean = 87.8 Range = 72.9 - 94.7
Std. Dev. = 4.8 Pearson's r = .20
Note. Correlation coefficient is based on raw scores

The relationship between preservice teachers' preferred learning style and final course score was low and positive (r = .21) (Table 3). The association indicated that preservice teachers preferring a field-independent learning style tended to have greater final scores in the Methods of Teaching Agriculture course.

Table 3

Relationship Between Learning Style And Final Course Score (n=82)

Final Course Score	Field-Dependence f	Field-Dependence %	Field-Independence f	Field-Independence %
75.0 - 77.9	1	2.9	0	0.0
78.0 - 80.9	3	8.8	0	0.0
81.0 - 83.9	2	5.9	3	6.2
84.0 - 86.9	3	8.8	7	14.6
87.0 - 89.9	8	23.5	10	20.8
90.0 - 92.9	12	35.3	13	27.1
93.0 - 95.9	5	14.8	15	31.3
Totals	34	100.0	43	100.0

Mean = 89.7 Range = 76.3 - 95.5
Std. Dev. = 4.3 Pearson's r = .21
Note. Correlation coefficient is based on raw scores

Conclusions and/or Recommendations

Preservice teachers of agriculture in the study differed in their preferred learning styles. Knowing that preservice teachers of agriculture prefer to learn differently, teacher educators in agriculture must be inclusive of the diverse learning styles found in their classrooms. It is recommended that teacher educators in agriculture consider the learning styles of preservice teachers when planning for instruction and determine the most effective instructional approaches for the given learning styles.

The preservice teacher curriculum in agricultural education should include instruction on learning styles. Preservice teachers of agriculture should have an understanding of how the learning styles of teachers and students influence and affect the teaching and learning process. In addition, preservice teachers should be taught how to adapt their teaching to be inclusive of the various learning styles of students.

It can be concluded that in the current study, a positive relationship existed between preservice teachers' preferred learning style and performance in the Methods of Teaching Agriculture course. Preservice teachers preferring a field-independent learning style achieved greater scores than preservice teachers preferring a field-dependent learning style in the microteaching laboratory and final course score. The findings suggest that preservice teachers of agriculture possessing a field-independent learning style appear to be more adapted at teaching utilizing the problem-solving approach.

The findings are congruent with research (Witkin, Moore, Goodenough, & Cox, 1977) that found teachers possessing a field-independent learning style to be more adapted at teaching using the problem-solving approach and tended to utilize the approach more in teaching (Koppelman, 1980). The findings further support Dunn and Dunn's (1979) conclusion that "teachers teach the way they learned" (p. 241). Teachers preferring a field-independent learning style perceive analytically, therefore find it easier to use problem-solving in teaching. Conversely, teachers preferring a field-dependent learning style perceive globally and find it more difficult to use problem-solving in teaching.

Witkin, Moore, Goodenough, and Cox (1977) stated that "field-independent persons have shown interest in the teaching of vocational-agriculture" (p. 40). Can the interest of persons with field-independent learning styles to teach agriculture be linked to the problem-solving approach? Furthermore, can placing an emphasis on teaching using the problem-solving approach influence field-dependent persons to perceive the inability to quickly succeed in teaching agriculture, thus causing job dissatisfaction and ultimately declining to continue in the profession?

If field-dependent persons are experiencing difficulty in teaching using the problem-solving approach, then teacher educators in agriculture must seriously consider providing preservice teachers with alternative approaches to teaching agricultural content. Further research needs to be conducted to explore what happens, if anything, to field-dependent learners who enter a profession which specializes in problem-solving teaching.

Additional research on the learning styles of preservice teachers of agriculture should be conducted in an effort to more effectively educate and supervise teachers of agriculture. Furthermore, research on teachers' learning styles should be expanded to secondary agriculture teachers. With additional research on learning styles, teacher educators will be in an improved position to educate and prepare teachers of agriculture.

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A Critique

Steven R. Harbstreit, Kansas State University-Discussant

Cano and Garton studied, over a three-year period, preservice teachers' learning styles and their relationship with their performance in an undergraduate agricultural teaching methods course. They used a standardized instrument to classify the student's learning styles as either field-dependent or field-independent. Relationships between he students performance in a methods of teaching agriculture course and their learning styles were then assessed.

A strength of this study was that if focused on a topic of current interest to educators. An indication of this can be found in the October 1992 issue of The Teaching Professor. It was reported that "Research on the learning styles of underrepresented groups has gained more visibility as campuses struggle to create climates conductive to the learning needs of all students . . . Even if your mix of teaching styles may not be ideal, it's better than no mix at all."

Some questions:

1. Since one of the variables reported concerning learning styles was gender, was there a gender difference in final course scores?
2. The authors reported a low positive (r=.21) relationship between preservice teachers' preferred learning style and final course score. Borg and Gall(1983) indicate that relationships in this category have meaning in exploratory research but they are of little value in practical predictions. Since a relationship of this value indicates that only approximately 4 percent of the variance in the two measures are common to both, has enough research been completed to recommend changes in teacher education preservice courses?
3. If enough information exists to recommend changes in preservice courses, specifically what changes should be made in methods of teaching agriculture courses to assist all teachers so that students of both learning styles will be successful?

The authors are to be commended for raising the question about the use of problem-solving approach with students with both field-dependent and field-independent learning styles. This issue has significant implications for the profession.

SUMMER AGRICULTURAL PROGRAM ACTIVITIES

BY: DR. MICHAEL K. SWAN, NORTH DAKOTA STATE UNIVERSITY

Introduction

In vocational education, where preparation for employment is a prime consideration, one must consider both knowledge accumulation and skill development through "doing" experiences. The philosophy of agricultural education supports Morton's (1978) claim that "learning by doing" is considered essential to learning. In agricultural education, summer is one of the best times to involve students in agricultural skill activities. Heavily accelerated production efforts as well as increased activity in associated service and supply businesses during the summer months provide timely opportunities for education and skill development. Agricultural education knowledge and skill development, therefore, should not be restricted to the standard nine-month school year; both should continue throughout the entire year, including summer months (Camp, 1986). Summer instructional programs have been the topic of many discussions/articles throughout the past years in agricultural education. Research findings have supported the value of summer instructional programs in agricultural education and their importance to the local and national economies in the past (Camp, 1986, Brannon, 1989). Current economic conditions and resulting pressure from these conditions on schools, coupled with the educational reform movement and corresponding static or declining enrollments, have forced school administrators to look for ways to economize within the school operating budgets. One place many administrators have investigated for possible budget reductions has been the "hands-on" vocational education programs, including agricultural education.

Purpose and Objectives

The purpose of this study was to ascertain philosophically ideal agricultural education summer program activities as perceived by teacher educators and state supervisors nationwide. The following objectives were investigated as part of this study:

1. Identify the perceived ideal agricultural education summer program activities in times of economic constraint and emphasis on academic versus vocational achievement.
2. Determine how many days study participants would assign to the major summer program activity categories during this time of economic constraint and academic emphasis.

Methods

Instrument: A questionnaire was developed using "A Vocational Agriculture Teacher's Guide To Planning Summer Programs" (Kotrlik, 1985; Camp, 1986) and the "Policies and Procedures Handbook for Oregon Vocational Agriculture Programs" (Oades & Deeds, 1978).

Selection of Scale: A summated rating scale was utilized to provide an index for placing each of the summer program activities in rank order. The responses indicated the level of importance respondents attached to each of the activities. The descriptors ("No Importance," "Moderate Importance," and "High Importance") were attached to the seven-point scale, thus ensuring similar interpretations of the scale by all respondents. Ideal quality indicators would be determined by each group's ranking of "High Importance" to the agricultural education summer program activities.

Testing of Items: The questionnaire included the following eight major categories of agricultural education summer program activities: 1) agricultural organizations and associations,

2) departmental administration, 3) FFA, 4) instructional improvement, 5) professional growth, 6) resource improvement, 7) supervised agricultural experience (SAE), and 8) teaching/ recruitment. Thirty-eight specific summer program activities within the eight major categories were identified and were included in the questionnaire. The questionnaire was field tested using a panel of experts. The reliability coefficient (Cronbach Coefficient Alpha) was used to determine reliability of the instrument; internal consistency was r = .949. The alpha level for statistical testing in this study was set at .05 level for all tests.

Selection of Sample: A random sample from the population was determined by statistical methods identified by Cohen (1969). A panel of current teacher educators used the directory of AAAE to identify all agricultural educators whose major responsibilities were teaching agricultural education courses at the undergraduate and graduate levels. These individuals became the population for this component of the study. State supervisors were identified for participation in the study using a directory of state supervisors as published by the U.S. Department of Education. All samples were randomly selected from a population who had not already been used to validate the study instrument. All populations excluded members who had not completed one full year in their current positions. The composite response rate was 90.9 %, which included 161 out of 177 returned questionnaires. Individual response rates included: teacher educators n=123 (91.9 %), state supervisors n=54 (88.9 %).

Collection of Data: Questionnaires and cover letters were mailed to each participant. A second questionnaire and letter was mailed to non-respondents three weeks after the first mailing. A random selection of 20 percent of non-respondents received telephone contact three weeks after the second mailing.

Data Analysis: Descriptive statistics were used to describe the perceptions of summer program activities in the eight categories. Differences in perceptions between the groups were determined by using Multifactor Analysis of Variance, LSD and Scheffe, at the .05 alpha level.

Results & Conclusions

Objective 1: Those agricultural education summer program components to be used as the ideal quality indicators according to teacher educators and state supervisors that were identified by a ranking of "high importance" are reported in Table 1. Attending annual summer update conferences and supervising agricultural students' home projects (SAE) tied in their ranking. Teacher educators and state supervisors appear to observe agricultural education summer program activities as similar to one another. Means of the state supervisors were weighted so they would be equal in statistical value to the means of the teacher educators.

Table 1
IDEAL SUMMER PROGRAM ACTIVITIES RANK ORDER OF IMPORTANCE AS PERCEIVED BY TEACHER EDUCATORS (TE) AND STATE SUPERVISORS (SS)

Activity	Rank	Mean	SD	SE	% Rating Item Importance n=113	% Rating Item Importance n=48
Attend annual summer update conference	1.5	6.2	1.3	.10	90.3	87.5
Supervise agricultural students' home projects (SAE)	1.5	6.2	1.4	.11	89.4	91.7
Visit prospective agricultural students and parents	3.5	6.0	1.4	.11	79.6	85.4
Supervise agricultural cooperative work experience (CWE)	3.5	6.0	1.5	.12	86.7	85.5
Provide individualized instruction to students	5	5.9	1.4	.11	79.6	70.8
Vacation/Family	6	5.8	1.5	.12	78.7	77.1
Maintain communications with school administration	8	5.7	1.4	.11	73.5	66.7
Supervise land lab/greenhouse used by students	8	5.7	1.5	.12	76.0	83.3
Develop future SAE/CWE sources	8	5.7	1.4	.11	72.6	75.0
Plan & supervise FFA activities	10	5.6	1.3	.10	65.5	75.1

Agricultural education teacher vacation is not part of the extended contract for teachers but appears here because study participants felt it was important for teachers to plan

vacations with their families around their extended contract activities. Supervision of agricultural students' home projects (SAE) was not statistical different among any of the study grooups. Maintaining communication between and among school administration was identified as an important aspect by these study groups.

Objective 2: The number of days perceived by study participants to be allocated to the current summer activities program ranged from 37.0 days to 40.3 days found in Table 2.

Table 2
MEANS OF THE NUMBER OF DAYS CURRENTLY BEING ALLOCATED AND WHICH IDEALLY SHOULD BE ALLOCATED TO THE EIGHT MAJOR CATEGORIES OF AGRICULTURAL EDUCATION SUMMER PROGRAM ACTIVITIES

Activity	Grand Mean	TE Mean	SS Mean	TE SD	SS SD	TE SE	SS SE
Agricultural Organizations and Associations							
Current	2.8	3.1	2.4	3.0	2.1	0.2	0.3
Ideal	3.5	3.6	3.3	4.1	2.2	0.4	0.3
Department Administration							
Current	4.8	5.5	3.8	7.0	3.3	0.6	0.4
Ideal	4.8	4.9	4.5	3.5	3.8	0.3	0.5
FFA							
Current	7.2	7.1	7.4	5.3	5.5	0.5	0.8
Ideal	7.1	6.7	8.1	3.4	5.1	0.3	0.7
Instructional Improvement							
Current	4.5	4.6	4.4	5.3	5.1	0.5	0.7
Ideal	4.8	4.8	4.9	3.9	4.7	0.4	0.6
Professional Growth							
Current	4.3	4.4	4.1	3.6	3.8	0.3	0.5
Ideal	5.9	6.5	4.4	5.6	2.8	0.5	0.4
Resource Improvement							
Current	3.4	3.8	2.4	6.7	2.5	0.6	0.3
Ideal	4.2	4.3	4.0	4.3	4.4	0.4	0.6
SAE							
Current	8.7	8.7	8.6	7.5	7.7	0.7	1.1
Ideal	13.0	13.0	12.9	7.3	8.2	0.7	1.1
Teaching/Recruitment							
Current	3.3	3.1	3.9	2.7	4.6	0.3	0.6
Ideal	6.8	6.7	7.0	6.0	5.6	0.6	0.8
Totals							
Current	39.0	40.3	37.0				
Ideal	50.1	50.5	49.1				

The number of days currently being allocated, as identified by the teacher educators' and state supervisors' composite scores, was found to be 39.0. Perceptions of the number of days currently being allocated to SAE was found to have the most variation among the eight categories as identified in the comparison of current and ideal days. As identified by teacher educators and state supervisors nationwide, the ideal number of days that should be allocated to the summer program activities was 50.1. Perceptions of the number of days currently being allocated to department administration was found to have the most variation among the eight categories. Perceptions of the number of days which should ideally be allocated to professional growth was found to have the most variation among the eight categories. All groups indicated increases from current allocation to ideal allocation of days for summer program activities.

Conclusions/Implications

Because the primary reason for extending the contract of the agricultural education teacher is the supervision and/or instruction of students, it is important for teachers to maximize the time spent with students and the time spent on activities that are unique to the summer program activities. If this is done, the agricultural education teacher should be able to justify a summer program activities. No other reasons alone justify a summer program, unless the entire school operates in that manner.

1. It is important for agricultural educators to maximize the time spent on activities that are unique to the agricultural education summer program. Time spent on activities for which other teachers are responsible was rated very low in importance.
2. An ideal summer agricultural program should be allocated 50 days and emphasize more closely, the summer program activities as identified by teacher educators and state supervisors.
3. A greater emphasis on communication between agricultural educators and school administration may need to occur if agricultural programs are to develop a highly effective summer program for the future. Many differences that existed in this study point out the need for better planning, communication, and implementation for agricultural education summer programs in order to serve the students during the summer.
4. Agricultural educators need to develop a comprehensive program of visiting prospective agricultural students and parents to ensure enrollments in the future.

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SUMMER AGRICULTURAL PROGRAM ACTIVITIES

A Critique

Steven R. Harbstreit, Kansas State University-Discussant

The purpose of this study was to ascertain philosophically ideal agricultural education summer program activities as perceived by teacher educators and state supervisors nationwide. The author is to be commended for addressing an issue of current importance as agriculture department are attempting to address dramatic changes in curriculum toward agriscience, changing student populations, and shifts in the agriculture industry. The importance of summer programs to the overall effectiveness of agriculture programs has continued to be valued as an important component of a complete agriculture program by teacher educators and state supervisors. This study attempts to establish some guidelines for activities that should be a part of each summer program.

Some questions:

1. What guidelines were provided state supervisors and teacher educators concerning their response to current and ideal number of days which ideally should be allocated for agricultural education summer programs? (Example: Number of days total to work with?)
2. What were some of the thirty-eight specific summer program activities which made up the eight major categories on the questionnaire? This would have been helpful in understanding a category such as "Supervise agricultural students' home projects" a term that would seem to be rather dated.
3. Table 1 would seem to have some headings missing on the last two columns. It can only be assumed by the "n" that the last two columns are teacher educators and state supervisors.
4 Table 2 raises some additional questions. Were the responses by state supervisor concerning the number of days currently being allocated to various activities based on some definitive data such as required state reports? If so, this may have accounted for the difference between state supervisors and teacher educators.
5. The length of the paper was such that considerable additional information could have been provided and still remain within the guidelines. This is not intended to indicate that more is better, however this paper leaves the reader with numerous questions.
6. What about the perception of the importance of summer programs to other groups. (administrators & parents)

A DESCRIPTION OF LEARNING STYLES OF FARM BUSINESS MANAGEMENT STUDENTS IN SOUTHWESTERN MINNESOTA

By Gerald Baerg & Gary Leske
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Introduction

The provision of education for adult farmers began with the Smith-Hughes Act of 1917, and additional efforts were made to provide farm management education for veterans in the 1940's. Later, non-extension farm management education efforts in Minnesota, which had been provided by local school districts were administratively transferred to the State Board of Technical Colleges in 1983. There are currently more than 6,000 farmers enrolled in adult farm business management education programs in Minnesota, with about 600 in the southwest region (Klingbeil, Joerger & Persons, 1991).

The program seeks to approach the farm business entity as a whole, and then look at the subsystems which make up the farm business. Instructional delivery is divided into classroom instruction, small group interaction, and individualized instruction, with the adult learner's own business as a textbook. In addition, class assignments consist of setting and achieving business as well as family goals. The sequence of instruction is intended to upgrade and increase business management skills by starting with the basic knowledge and skills needed by managers, and progressing to higher level knowledge and skills.

The Minnesota Farm Business Management Program (MFBMP) carries out needs assessments to find out what content areas are needed by clients. Although adult education principles are used in the program, not a great deal is known about how this specific population of farmers prefer to learn. Wilson and Morren (1990) have proposed that many agricultural problems require different perspectives acquired by different learning styles in order to gather enough information to arrive at an appropriate solution. Curry (1990) noted that the learning styles field claims to influence four aspects of teaching and learning in schools: curriculum design, instructional methods, assessment methods, and student guidance. One might ask if the MFBMP has been using curriculum and instructional methods which are most suited to meeting the preferred learning style needs of its students?

David Kolb (1984,1986) has developed an experiential learning model to describe how adults learn. It rests on two assumptions: that people learn from experience that occurs in all human settings, and that people learn through a preferred learning style. The model is based on the work of Carl Jung, Kurt Lewin, and Jean Piaget, and it describes how experience is translated into ideas that guide the

choice of new experiences (Kolb, 1984). Kolb identifies five sets of forces that shape a person's learning style: personality type, educational specialization, professional career choice, current job role, and the current task/problem that a person is engaged in.

Kolb developed a self-reporting inventory (Learning Style Inventory or LSI) which identifies a respondent's preference for four learning abilities lined up on two axis: concrete experiences and abstract conceptualization axis (measures the kind of experience), and reflective observation and active experimentation axis (measures the level of activity). Scores from these preferences are then used to calculate one's learning style, of which there are four. A converger is one who likes to see practical applications and does best when there is a single correct answer. A diverger, on the other hand, is imaginative and tends to view things from a number of perspectives. An assimilator likes to deal with abstract concepts and create theoretical models to explain what is happening. Finally, an accommodator likes doing things, solves problems by trail and error, and is action and people oriented. People may use different learning styles depending on the situation, but tend to find one most comfortable and efficient.

Kolb (1984,1986) lists specific instructional methods and learning situations those with different learning abilities prefer to use. Those who scored high in concrete experience preferred personalized feedback, shared feelings, activities that use real life problems, the opportunity to be self-directed and autonomous, and the avoidance of theoretical reading assignments. Learners scoring high in reflective observation preferred teacher guided discussions, and opportunities to observe and see different perspectives, while not being helped by task-oriented activities. Those who scored highest in abstract conceptualization liked symbolically related activities such as case studies, thinking alone, and theory readings, while feeling hindered by group activities, simulations, and sharing personal information. Finally, learners who scored high in active-experimentation liked small group discussions, projects, homework problems, and skill application activities, while feeling less helped by lectures and situations involving a lot of teacher direction. Since a class may contain individuals with different learning preferences, McCarthy (1990) advocates that teachers use a variety of instructional activities in order to encourage the interest and learning of each student.

By knowing the learning styles of their students, farm business management instructors can deliver lessons using instructional methods that can increase the learning and satisfaction of the students. One wonders if the learning styles of students in the MFBMP are different than those of Kolb's normative sample?

Purpose and Objectives

This study sought to describe the learning styles of southwest Minnesota adult farm business management program area students. The study objectives were:

1. To describe the learning styles of students in farm business management program.

2. To compare the learning styles of farm business management students and Kolb's normative sample.

3. To describe the instructional method preferences of farm business management students.

Procedures

Materials used in the study included Kolb's Learning Style Inventory and a questionnaire seeking mainly demographic information and preferred instructional methods. The reliability of Kolb's LSI was reported to have Cronbach Alphas of between .73 and .88 for the learning dimensions, while the Spearman-Brown Split-Half Reliabilities were reported between .71 and .85 (Kolb, 1986). Kolb discussed validity by showing the relationship between learning styles and a career field of study.

The population that this study sought to investigate consisted of students enrolled for at least one year in the southwest area of the MFBMP. The number enrolled in 1992 was about 600. A sample that consisted of five students from each farm business management instructor in the southwest area was sought during early April, 1992. Of the 22 instructors working in the area, 12 eventually agreed to send materials to five individuals randomly selected by the researchers, from the instructor's class lists. The researchers were not given access to the student's names or addresses.

Students mailed their materials directly to the researcher. One follow up reminder was sent in mid-April by way of the instructors. Due to the start of the planting season, a second follow up was not sent. Of the 60 packets sent by the 12 instructors, 39 were returned to the researchers, a response rate of 65 percent.

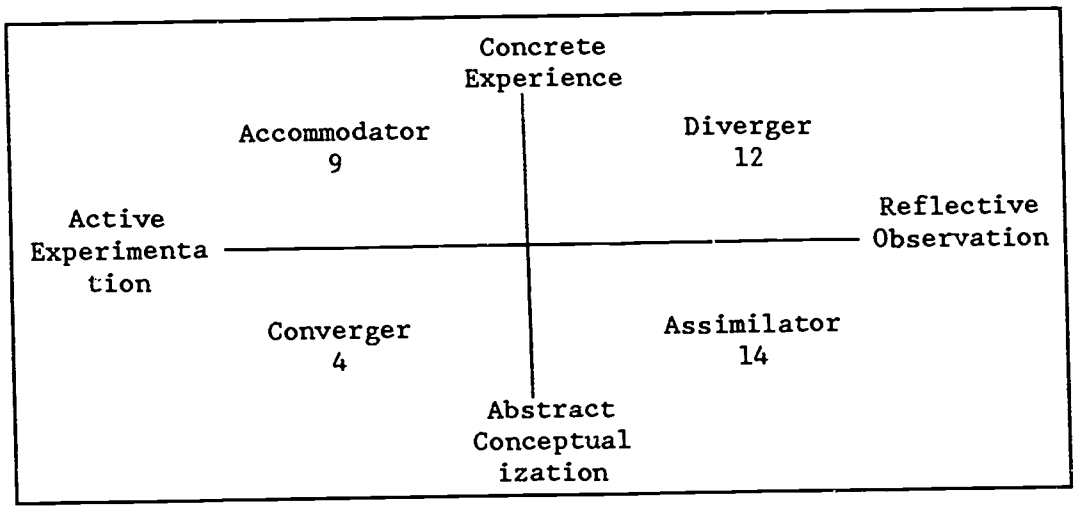
The sample's gross farm income information indicated that the sample farms appeared to be somewhat larger than the population. Of the 39 responses, 32 were completed by males while 7 were completed by females. The mean age of respondents was 36.9 years of age. Educationally, one had less than a high school diploma, ten were high school graduates, five had one year beyond high school, thirteen two years beyond high school, four received three years beyond high school, four were college graduates, and two had education beyond a bachelor's degree. The mean time respondents had been in the farm business management program was 6.5 years. The type of farm operation from which most of the respondent's farm

income came was mainly crops for 17 respondents, mainly swine for 5 respondents, mainly dairy for one, and 16 respondents identified their farm operations as diversified (which was defined as farm income being about equally divided between two or more enterprises). Of the 37 who reported a category of gross farm income, ten earned less than $50,000, five from $50,001 to $75,000, two from $75,001 to $100,000, and twenty earned over $100,001.

Results

The first objective was to describe the learning styles of farm business management students in the southwest program area of Minnesota. Of the 39 respondents, Kolb's LSI identified 14 as having the assimilator learning style, 12 the diverger learning style, 9 the accommodator style, and 4 the converger style. When examining the active experimentation - reflective observation axis, 13 of the respondents were found to prefer taking an active part in learning activities while 26 preferred to observe and reflect on an activity. For the concrete experience - abstract conceptualization axis, 21 respondents preferred to understand in a concrete way while 18 preferred an abstract way of understanding. See Figure 1.

Figure 1
Learning Styles Based on the Two Axis
and the Number of MFBMP Students Having Each



The second objective was to compare the learning styles of farm business management students and Kolb's normative sample (Kolb, 1986). Using t-test procedures, no significant difference were found between the means of Kolb's sample and those of the farm business management students for two basic scales and for the two axis. However, there were significant differences (.05) between the means for the reflective observation and active experimentation scales. The means for the farmers suggested that they preferred reflective observation more than the normative group and that they preferred less active experimentation than the normative sample. See Table 1.

Table 1
Raw Scores on the Learning Styles Inventory Scales

	Kolb's Normative Means[a]	MFBMP Sample Mean[b]
Concrete Experience (CE)	26.0	25.1
Reflective Observation (RO)	29.9	34.0*
Abstract Conceptualization (AC)	30.3	29.1
Active Experimentation (AE)	35.3	32.6*
AC - CE Axis	4.28	4.00
AE - RO Axis	5.92	-1.38

Note. Kolb's normative mean from Kolb, 1986.
$a_n = 1446$ $b_n = 39$
*$p<.05$

The third objective was to describe the instructional method preferences of farm business management students. Respondents were asked to rate seven instructional methods on a scale with one representing the most preferred instructional method and seven the least preferred. Means for each method were calculated for each method. One-on-one discussion with their instructor was the most preferred instructional method and was followed by the use of guest speakers. See Table 2.

Table 2
Mean Ratings of Preferred Instructional Methods

	Mean Rating
One-on-one Discussion with Instructors	1.91
Guest Speakers	3.64
Newsletters	3.97
Computer Aided Instruction	4.24
Group Discussion	4.55
Class Lectures	4.67
Video	5.03

Note. One is most favored and seven least favored.

Conclusions

This study suggests that the farmers involved with the southwest Minnesota farm business management program more frequently tend to think their way through a new situation and observe others (reflective observation) rather than jumping in and trying things out (active experimentation) compared to Kolb's normative group.

According to Kolb, learners of this type tend to grasp new information observing a number of situational examples. Also, they tend to like the instructor as the communicator of information, a well-structured and clear presentation of ideas, study time alone, and acting based on an understanding of the situation. It is interesting to note that this fairly well describes what currently takes place in the MFBMP.

Consistent with the characteristics of reflective thinkers, respondents prefer one-on-one instruction with their instructors and meetings with guest speakers. Teachers are seen as guides in the learning process.

Some recommendations for southwest area MFBMP instructors are:

1. They should use instructional techniques that are effective for all learning styles, but emphasize instructional techniques that are preferred by diverger and assimilator types of learners. These include helping the student integrate past experiences and knowledge with new experiences and knowledge (diverger needs), and introducing theories and models that will help in explaining and analyzing (assimilator needs)(Kolb, 1986).

2. They should continue to use one-on-one instruction with program participants.

3. They should make certain that the principles of management are presented in an organized way since those students who have assimilative learning styles like to know the theory behind procedures.

While a greater portion of farmers involved with the southwest Minnesota FBMP are more reflective thinkers than the general population, we still do not know if this is a characteristic of farmers in the MFBMP or Minnesota farmers in general. Further study is needed to determine if the findings of the study are also true for MFBMP participants throughout Minnesota. It would also be interesting to determine if the findings hold for Minnesota farmers in general. There are other questions of interest such as: Do farmers chose to remain in the program since its instructional methods are comfortable for their learning style preferences, and are those farmers who frequently use the cooperative extension service different from those who use the MFBMP?

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A DESCRIPTION OF THE LEARNING STYLE OF FARM BUSINESS MANAGEMENT STUDENTS IN SOUTHWESTERN MINNESOTA

Robert A. Martin, Iowa State University

The paper had a clear theoretical base established with support from a thorough literature review. The procedures appear to be appropriate for the study given the nature of the target population and the need to seek assistance in getting responses. Return rates on questionnaires are always a challenge and even more so in working with farmers. While we would like to have had a higher return, it is understandable why it was not over 65 percent. Perhaps a "reward" to the instructors for their assistance would have helped. The full explanation of the instrument was useful and helped in the explanation of the results.

The use of established instruments to collect data is commendable. The only question is what groups of people were used to establish the norms in the Kolb instrument? Were farmers included?

Why was biographical data on the farmers shared in the paper? While it was interesting it did not contribute to the section on procedures under which it was located and since this information was not a part of the study's objectives it seemed this information was out of place. It seemed more a report of demographic data collected in a study than a brief description of the population.

The objectives of the study were achieved but there is some question as to the meaning attached to the findings. There seemed to be a mixture of learning styles which is not all that surprising. The recommendation was made that we should use a variety of methods because of the variety of styles. However, there was a short list of instructional methods that were rated and the researchers recommended the use of one of them predominantly. What about all the other potential methods? How was the list determined? Why these instructional methods? Is there not a conflict between recommendations one and two? To some extent the study suffers from a chicken and egg problem. Do farmers rate methods and styles of learning high because they prefer them from a learning perspective or do they rate them high because that is what they are used to doing or accustomed to in learning situations?

Are we measuring comfort and tradition or are we measuring preference from a learning theory perspective? From an adoption-diffusion theory standpoint it is an important question.

This study may have raised more questions than it answered. Nevertheless, the researchers should press on.

RELATIONSHIP OF CONFLICT MANAGEMENT STYLES TO PERSONALITY PREFERENCES OF EXTENSION ADMINISTRATORS

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Introduction

Conflict is a reality in everyone's life and should be considered a natural process that occurs daily. However, for most, conflict has negative connotations, invokes negative feelings and often leads to destruction (Lindelow and Scott, 1989). "Whether the effect of conflict is good or bad depends on the strategies used to deal with it" (Rahim, 1986, p. vi).

> Today, the . . . administrator is typically faced with a vast array of conflict situations, both within a given institution and between that institution and its various external publics. The manner in which . . . administrators have traditionally handled such conflicts has been based on the belief that conflict should be thoroughly analyzed, suppressed, and eliminated. Conflict therefore was viewed as being dysfunctional and time consuming. Over the years, however, successful administrators have begun to recognize that in many instances conflict can be a sign of a healthy . . . organization (Darling & Brownlee, 1984, p. 243).

Dealing with conflict between and among individuals can be one of the most frustrating and uncomfortable experiences for administrators. According to Schmidt and Tannenbaum (1960), when conflict occurs "strong feelings are frequently aroused, objectivity flies out the window, egos are threatened, and personal relationships are placed in jeopardy" (p. 107). Robbins (1974) stated that "any attempt by an administrator to alter a specific conflict position requires that he [sic] be knowledgeable of its origin. An understanding of the source improves the probability that the proper resolution or stimulation technique will be selected" (p. 29).

Extension administrators are constantly dealing with conflict situations such as "allocation of funds to positions, travel, supplies, etc. [Additionally], . . . poor job design and unclear reporting relationships can cause conflict over work arrangements" (Buford

and Bedeian, 1988, p. 185). More specifically, two different work groups within Extension can become entangled in conflict if they pursue different goals and objectives. Extension Directors and District Directors are in positions where they are prone to encounter these conflict situations in their day to day administrative duties.

According to Rahim (1986), studies conducted in the area of organizational conflict management have (a) "attempted to measure the amount of conflict at various organizational levels and to explore the sources of such conflict;" and (b) "related the various styles of handling interpersonal conflict of the organizational participants and their effects on quality of problem solution" (p. 27). Therefore, Rahim (1986) concluded that it is essential to understand the distinction between the amount of conflict at numerous levels and the styles used to handle interpersonal conflict. This data is needed to provide administrators insight regarding psychological type preferences and how they influence an individual's conflict management style. This will enable administrators to utilize this knowledge when they are: (a) building teams, (b) encouraging creativity among faculty, (c) building group dynamics, (d) exploring job satisfaction, and (e) examining work productivity of faculty.

Purpose and Objectives

The purpose of this study was to determine the conflict management styles and the Myers-Briggs Type preferences of the Directors and District Directors of the Cooperative Extension Service's North Central Region. The study also examined the relationships that existed between the conflict management styles and Myers-Briggs Type Preferences and selected demographic characteristics of Directors and District Directors. The specific objectives of the study were to:

1. describe the conflict management styles of the Cooperative Extension Service's North Central Region Directors and District Directors.

2. describe the psychological type preferences of the Cooperative Extension Service's North Central Region Directors and District Directors.

3. describe what relationships existed between conflict management styles and psychological type preferences of Directors and District Directors.

4. describe what relationships existed among conflict management styles and demographic characteristics of Directors and District Directors.

Procedures

The participants in this descriptive-correlational census study were the 12 Extension Directors and the 68 District Directors within the Cooperative Extension's North Central Region. Completed surveys were obtained from 78 of the 80 administrators for a total response rate of 97.5 percent.

Two self-report questionnaires, the Myers-Briggs Type Indicator (MBTI) Form G and the Rahim Organizational Conflict Inventories-II (ROCI-II) Forms A and B, were used to measure the variables of interest. The MBTI was used to assess the psychological type preferences. This instrument is based upon the Jungian theory (Jung, 1923) "that the much seemingly random variation in behavior is actually quite orderly and consistent, being due to basic differences in the way individuals prefer to use their perception and judgment" (Myers and McCaulley, 1985, p. 1). Four dichotomous scales are used throughout the MBTI: extraversion (E) or introversion (I) -- reflects whether a person's attitude is oriented primarily toward the outer world or the inner world; sensing (S) or intuition (N) -- describes the function of how information is perceived; thinking (T) or feeling (F) -- describes the preference for making judgments; and judging (J) or perceiving (P) -- describes the attitude toward dealing with the outer world. Eight numerical scores are derived, which can then be transformed into four continuous scores.

The ROCI-II measures five independent conflict management dimensions that represent styles of handling interpersonal conflict, which are measured on a summated five point Likert scale, with one indicating strongly disagree and five indicating strongly agree. These five conflict management styles are integrating -- a win/win solution acceptable to both parties; obliging -- satisfying the concern of the other party; dominating -- a win/lose orientation or forcing one's position; avoiding -- withdrawing, passing-the-buck or sidestepping the situation; and compromising -- both parties give up something to reach a mutually acceptable solution. Form A measures how an organizational member handles conflict with his or her superior and was used with the Directors. Form B measures how an organizational member handles conflict with his or her subordinate and was used with the District Directors.

Both instruments were field tested to ensure face and content validity using five Extension administrators within the Ohio Cooperative Extension Service. Reliability and internal consistency were calculated for both and MBTI and ROCI-II. The MBTI test-retest product-moment correlations were .96 EI, .95 SN, .77 TF and .90 JP while the split-half reliabilities were .83 EI, .89 SN, .83 TF, and .77 JP. The ROCI-II test-retest product-moment correlations were .40 integrating, .93 obliging, .95 dominating, .77 avoiding, and .69 compromising while the Cronbach's alphas were .84 integrating, .78 obliging, .72 dominating, .80 avoiding and .56 compromising.

Analysis of Data

Descriptive statistics were used to summarize and organize the data. Measures of association, using Pearson's Product-Moment and the Point-Biserial correlation coefficients, were utilized to determine the linear relationship between the conflict management styles, the Myers-Briggs Type preferences and selected demographic characteristics. "The conventional notation for MBTI correlations is followed, such that *positive correlations are associated with I, N, F, or P and negative correlations are associated with E, S, T, or J* (Myers and McCaulley, 1985, p. 176).

Results

The demographic variables of role status, gender, age, educational degree, major area of study and tenure were included in this study. Of the 78 individuals that provided data, the majority were male (76.9 percent) whereas less than one-fourth were female (23.1 percent). The mean ages were 52.6 and 50.1 years for Directors and District Directors respectively. Nearly 92 percent of the Directors held a doctorate degree whereas slightly more than 71 percent of the District Directors held a master's degree. The majority of the respondents' (74.4 percent) major area of study for their highest academic degree was in the social sciences. The average number of years employed in Extension was over 22 years for both Directors and District Directors. Two-thirds (66.7 percent) of the Directors and nearly 40 percent of the District Directors had less than five years experience in their current positions. The average tenure as an administrator, including service in other organizations, was 15.7 years and 11.9 years for Directors and District Directors respectively.

Both the Directors and the District Directors indicated that the integrating conflict management style was their most preferred style when they were found to be in a conflict situation. As shown in Table 1, the Directors, with a mean score of 4.81, were found to use the integrating style significantly more than did the District Directors, with a mean score of 4.32, but no differences were found between the administrators on the remaining four styles.

Table 1. Mean Conflict Management Styles Scores for Directors and District Directors (n = 78)

Group	n	Mean	sd	t
Integrating				
Director	12	4.81	.27	< .001*
District Director	66	4.32	.47	
Obliging				
Director	12	3.51	.31	.34
District Director	66	3.68	.59	
Dominating				
Director	12	2.90	.88	.40
District Director	66	3.13	.57	
Avoiding				
Director	12	2.72	.82	.36
District Director	66	2.96	.77	
Compromising				
Director	12	3.58	.64	.30
District Director	66	3.79	.48	

Note. 1 = Strongly Disagree; 5 = Strongly Agree

* $p < .05$

Table 2 indicated that the majority (26.9 percent) of the population was of the ESTJ personality type whereas the majority (33.3 percent) of the Directors was of the ISTJ personality type. The ENTJ personality type accounted for the second largest percentage (15.2 percent) of District Directors whereas the ESTJ personality type accounted for the second largest percentage (25 percent) of Directors. The individual with an ESTJ personality preference is practical, realistic, matter-of-fact, has a head for business, likes to organize and run activities and makes a good administrator if they consider other's feelings.

Table 2. Myers-Briggs Types of Extension Administrators (n = 78)

	All Administrators (n = 78)		Directors (n = 12)		District Directors (n = 66)	
MBTI Type	n	%	n	%	n	%
ISTJ	11	14.1	4	33.3	7	10.6
ISFJ	2	2.6	0	0.0	2	3.0
INFJ	1	1.3	0	0.0	1	1.5
INTJ	4	5.1	0	0.0	4	6.1
ISTP	1	1.3	0	0.0	1	1.5
ISFP	1	1.3	0	0.0	1	1.5
INFP	1	1.3	0	0.0	1	1.5
INTP	3	3.8	0	0.0	3	4.5
ESTP	3	3.8	1	8.3	2	3.0
ESFP	0	0.0	0	0.0	0	0.0
ENFP	5	6.4	2	16.7	3	4.5
ENTP	6	7.7	1	8.3	5	7.6
ESTJ	21	26.9	3	25.0	18	27.3
ESFJ	5	6.4	0	0.0	5	7.6
ENFJ	4	5.1	1	8.3	3	4.5
ENTJ	10	12.8	0	0.0	10	15.2

Note. E = Extravert, I = Introvert; S = Sensing, N = Intuition; T = Thinking, F = Feeling; J = Judging, P = Perceiving

An individual with an ISTJ personality preference is serious, quiet, practical, orderly, matter-of-fact, logical, realistic, dependable, well organized but will work toward a goal regardless of distractions. Those individuals who prefer the ENTJ personality preference are hearty, frank, leaders in activities, good at reasoning and public speaking, well informed but may appear more confident than their experience warrants (Myers and Myers, 1987).

The associations between the MBTI preferences and selected characteristics, as shown in Table 3, indicated that the intuition preference had a low (Davis, 1971)

association of .21 and .24 with the major area of study and educational degree respectively. The associations between the conflict management styles and selected characteristics indicated that the integrating conflict management style showed a moderate association of -.37 with role status while the obliging conflict management style showed a moderate association of -.33 with educational degree.

Table 3. Relationship Between Role Status, Gender, Major Area of Study and Educational Degree with MBTI Preferences and Conflict Management Styles (n = 78)

Characteristics	Role Status[a]	Gender[b]	Major Area[c] of Study	Educational[d] Degree
Myers-Briggs Type Preferences				
Extravert/Introvert	-.10	.16	.05	.17
Sensing/Intuition	-.08	-.10	.21*	.24*
Thinking/Feeling	.09	-.16	.04	-.09
Judging/Perceiving	.07	-.09	.02	-.01
Conflict Management Styles				
Integrating	-.37*	-.12	.05	.07
Obliging	.11	-.14	.03	-.33*
Dominating	.13	-.02	-.01	.01
Avoiding	.11	-.04	.12	-.10
Compromising	.15	-.10	.01	-.13

Note. Coefficients reported as Point-biserial correlations

a: Directors = 0; District Directors = 1

b: Females = 0; Males = 1

c: Natural Science = 0; Social Science = 1

d: Master's or less = 0; Doctoral = 1

* $p < .05$

Correlations, shown in Table 4, between the conflict management styles and the MBTI preferences revealed that the intuition preference had a low correlation of .25 with the integrating conflict management style while the sensing preference had a low correlation of -.24 with the avoiding and a low correlation of -.19 with the compromising conflict management styles. The judging preference was shown to have a low correlation of -.22 with the avoiding conflict management style.

Measures of association between the conflict management styles and selected demographic characteristics indicated that the integrating style showed a low correlation of -.18 with tenure as an administrator while the obliging style showed a low correlation of -.29 with tenure as an administrator. The dominating style had a low correlation of .18 with tenure in current position while the avoiding style had a low correlation of .20 with tenure in Extension.

Table 4. Summary Data: Intercorrelations Between Selected Characteristics and Conflict Management Styles (n = 78)

Characteristics	Intercorrelations																		
	X_1	X_2	X_3	X_3	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	Y_1	Y_2	Y_3	Y_4	Y_5	Mean	sd
Role Status[a] (X_1)	1.00	.02	.20*	-.18	-.07	-.13	-.01	-.50*	-.10	-.08	.09	.07	-.37*	.11	.13	.11	.15	.85	.36
Yrs Extension (X_2)		1.00	.46*	.36*	.07	.64*	.23*	.02	.07	-.30*	-.03	-.24*	-.11	.01	.00	.20*	.06	22.85	8.39
Yrs Current Position (X_3)			1.00	.41*	.02	.51*	.14	.00	.08	.01	.13	-.02	-.05	-.03	.18*	-.06	.07	6.92	5.82
Yrs Administrator (X_4)				1.00	.14	.55*	.17	.26*	.05	.07	-.24*	-.06	-.18*	-.29*	.10	-.02	-.04	12.49	7.76
Gender[b] (X_5)					1.00	.12	-.32*	.35*	.16	-.10	-.16	-.09	-.12	-.14	-.02	-.04	-.10	.77	.42
Age (X_6)						1.00	.00	.22*	.05	-.15	-.03	-.13	-.14	-.14	.14	.11	-.03	50.45	7.22
Major Area of Study[c] (X_7)							1.00	-.05	.05	.21*	.04	.02	.05	.03	-.01	.12	.01	.74	.44
Educational Degree[d] (X_8)								1.00	.17	.24*	-.09	-.01	.07	-.33*	.01	-.10	-.13	.36	.48
MBTI Preferences																			
Extravert/Introvert (X_9)									1.00	.20*	-.25*	-.14	.02	-.17	-.12	.00	-.07	90.36	25.38
Sensing/Intuition (X_{10})										1.00	.25*	.60*	.25*	-.16	.09	-.24*	-.19*	96.87	32.07
Thinking/Feeling (X_{11})											1.00	.32*	.07	.12	.05	-.05	.03	81.85	24.71
Judging/Perceiving (X_{12})												1.00	.17	-.05	.04	-.22*	-.14	84.95	28.99
Conflict Mgt. Styles																			
Integrating (Y_1)													1.00	.11	-.16	-.19*	.40*	4.40	.47
Obliging (Y_2)														1.00	-.11	.50*	.23*	3.66	.55
Dominating (Y_3)															1.00	.13	-.02	3.09	.62
Avoiding (Y_4)																1.00	.17	2.93	.78
Compromising (Y_5)																	1.00	3.76	.51

Note. Coefficients reported as Pearson's Product-Moment Correlations.

Conventional notation for MBTI correlations: positive correlations are associated with I, N, F, or P and negative correlations are associated with E, S, T, or J

a: Director = 0, District Director = 1; b: Female = 0, Male = 1; c: Natural Science = 0, Social Science = 1; d: Master's or less = 0, Doctoral = 1

* $p < .05$

The association between the MBTI preferences of the Directors and District Directors with their personal characteristics indicated that the sensing preference had a low association of -.30 with the tenure in Extension. The thinking/feeling preference exhibited a low correlation of -.24 with the tenure as an administrator indicating that the thinking preference was correlated with this characteristic. Tenure in Extension exhibited a low correlation of -.24 with the judging/perceiving preference indicating that the judging preference was correlated with this characteristic.

Conclusions

Based upon the review of literature and the findings related to the research objectives, the following conclusions, applicable to the population of this study, were reached:

1. Directors and District Directors indicated they use the integrating conflict management style when confronted with a conflict situation.

2. The majority of the administrators were of the thinking/judging personality style indicating they make logical, objective, and tough-minded decisions and prefer a decisive, structured and organized environment.

3. Administrators who favored the intuitive preference were more apt to use the integrating conflict management style when confronted with a conflict situation.

4. Administrators who favored the sensing preference tended to handle conflict situations using the avoiding or compromising conflict management styles.

5. Administrators who favored the judging preference were more apt to avoid conflict situations.

6. As tenure in Extension increased, the more the administrators preferred to use the avoiding conflict management style.

7. The longer the administrators remained in their current position, the more they tended to dominate the conflict situation.

8. The Directors and District Directors tended to use the integrating and obliging conflict management styles less as their tenure in an administrative position increased.

9. Administrators who held a master's degree or less were more apt to use the obliging conflict management style than those who held a doctoral degree.

Recommendations

1. Directors and District Directors need to understand the strengths and weaknesses inherent within each of the five conflict management styles and work toward being able to appropriately use each style depending upon the situation.

2. Extension administrators need to recognize and appreciate the diversity of personality type within their organization as this awareness can lead to (a) a better understanding of group dynamics, (b) building an empowered team, and (c) managing conflict in a constructive manner.

3. Extension administrators with considerable tenure should analyze the costs and benefits before using the avoiding conflict management style. If the benefits of resolving the conflict out weigh the costs or losses, then another conflict management style should be used to resolve the conflict and to avoid further complications.

4. It is recommended that the Directors and District Directors incorporate training and update sessions on conflict management and mediation techniques and skills into their inservice education programs and management retreats.

5. All new Extension educators' orientation should incorporate sessions on conflict management and mediation skills.

6. A short course on conflict management and mediation skills for all Extension educators should be offered at the Minnesota or North Carolina Extension Summer Schools.

7. It is recommended that conflict management and mediation be included as a major component of any graduate level course on administration and management in Extension or adult education.

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RELATIONSHIP OF CONFLICT MANAGEMENT STYLES TO PERSONALITY PREFERENCE OF EXTENSION ADMINISTRATORS

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Conflict management is certainly one of the key tasks of the administrator of a human resource entity such as Extension. This study sought to describe conflict management styles and personality types at work in Extension and describe any relationship there may have been prevalent in the North Central Region Extension system. The basis for the study was established, although briefly, in the introduction to the paper. This brief rationale statement provided a basis for establishing a clear statement of purpose and objectives. The procedures seemed appropriate for the nature of the study. There was a brief but clear explanation of the established instruments used in the study and a description of the instruments validity and reliability. The return rate of the questionnaire was quite good although nothing was reported to indicate what effort was expected to get nearly everyone to respond.

There is some concern in this study and the report of it when the authors first describe preferred style of management and then later state that participant's "use" a particular style. There is probably a bit of a gap between "preferred" style and "practiced" style and it is somewhat troubling that the authors make a "leap of faith" when writing about the results and conclusions to imply that what directors say they do and what they do are the same. What they say they do in management situations and what they do are not necessarily the same; if they were why would a study of this nature be necessary? The point is we still don't know what these administrators use. It would be more interesting to ask the staff members with whom these administrators work what they think about the administrator's style and personality. This would be somewhat more instructive. Perhaps the researchers plan to do this in phase two.

The findings indicate a troubling tendency toward more authoritarian behavior as administrators age in the job. Perhaps the real issue here is one of training rather than any other factor--personality or otherwise. Management literature tells us that perhaps the most important issue in the life of the administrator is that every situation is different and delivery of management must be situational. Therefore, every administrator needs a "box of tools" to use and the knowledge and skill to know not only how to use them but when.

The correlations seemed to be low but the researchers appeared to be direct and forceful in their conclusions and recommendations. Are the researchers justified in making more out of the data than may be there?

METHODOLOGICAL TRIANGULATION: AGRICULTURAL EDUCATION ENROLLMENT AND THE NON-TRADITIONAL STUDENT

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Introduction

Why did students who were so interested in agriculture that they are majoring in the College of Agricultural Sciences and Natural Resources (CASNR) not take agricultural education classes in their high school? A 1992(a) study by Bell and Fritz found females citing lack of career information explaining both traditional and non-traditional employment opportunities for females; a lack of counselor services providing awareness of non-traditional employment and career opportunities; a lack of an existing supportive network for participation in agricultural education courses; an agricultural education program delivery format not responsive to their needs; and difficulty in scheduling agricultural education courses.

A companion study (Bell & Fritz, 1992b) conducted with males with a similar background found males concurring that their decision to not enroll in secondary agricultural education courses was influenced by the lack of career information explaining opportunities in the agricultural industry. Additionally, males felt course content was not responsive to their specific interest in agriculture.

Method

The researchers set out to obtain complementary findings from Bell and Fritz (1992a and 1992b) using ethnographic methods to strengthen the earlier quantitative research results in studies with non-traditional female and male students who elected to not take agricultural education in high school but who enrolled in majors in the CASNR, University of Nebraska-Lincoln. The methodological triangulation contributes to the theory and knowledge development of non-traditional student enrollment deterrents in agricultural education (Morse, 1991).

Six students (three female and three male) were interviewed on the UNL campus by a researcher. The respondents were self-identified by a question on the survey instrument from the original female and male studies which asked if respondents would be willing to participate in a 30 minute, confidential interview. Responses were tape recorded with respondents' permission. The interviews were transcribed and returned to the respondents for verification. Interviews were analyzed by both researchers for emerging themes.

Purposes

Each respondent was asked the following probing questions: Why did you elect not to enroll in agricultural education courses in high school? (Grand Tour) Did you have a role model in your career area and, if so, what kind of influence did the role model have? Where did you receive career information? How should career information be presented to assist

students in making career choices? Did you consciously select a college preparatory track in high school? Do you feel high school agricultural education classes would have benefitted you in your current major? and (a discovery question) how did you feel once you realized your major was in the College of Agricultural Sciences and Natural Resources?

Findings

The following are student responses, grouped by question.

Why didn't you enroll?

Two students had been through a junior high agricultural exploratory course; one concluded the "importance of agriculture courses was not stressed in her high school"; the other was unwilling to forsake college preparatory courses to enroll in agriculture courses. Agriculture education courses "were not responsive" to Rich's needs. Julie felt agriculture education classes at her school "were about tractors and farming." Additionally, agriculture education courses were perceived by some respondents as less than challenging. According to Rossetti's (1988) study one of the reasons students don't enroll in vocational education courses is parallel to one of the results of the Bell and Fritz (1992b) study of non-traditional agricultural education enrollment: students perceive agricultural education is not responsive to their needs.

Role Models

Most respondents did not have a role model in their career area in high school but replied they had one or more role models in this stage of their educational process. Respondents spoke with respect and admiration for their role models and most were relying on role models for assistance in college course selection and career guidance. Role models were even more influential than the Bell and Fritz (1992a and 1992b) studies discovered.

Career Information

All respondents expressed a concern about the quantity and quality of the career guidance they received during their high school years. Brochures and flyers comprised most of the material students received. Much of the time respondents reported the information was not backstopped with any information or feedback from the counselor. All respondents reported they did not and would not have sought career information from the agricultural education teacher.

Career information should be given to students "during the ninth grade year". All respondents felt "interaction with people, a chance to talk to somebody about careers" would have been the most beneficial form of career information they could have received. Students at the junior high level have been identified by educational psychologists as having great difficulty dealing with abstractions (Santmire, 1985). Thus, face-to-face interaction with persons representing agriculture career areas would have aided students in moving their agriculture career thought processes beyond abstraction and toward concreteness.

College Prep

Ellen reported her counselor tried to discourage her from taking agricultural education courses. All but one respondent reported they selected the college prep "track" at the ninth grade. Most students were pushed by their family and other teachers into taking college prep courses; agricultural education was not perceived as a college preparatory course.

Benefits of Agricultural Education

Several respondents felt agricultural education classes would not have made a difference in their success of failure in agriculture-related classes in their college major; others felt it would have. They said lack of agricultural education made them feel "stupid" in some of their classes and feel like they were missing "a lot of the concepts" because of lack of background knowledge.

Major in the College of Agricultural Sciences and Natural Resources

Most of the respondents were aware their major was located in the College of Agricultural Sciences and Natural Resources (CASNR). Those who were not aware expressed feelings of "betrayal" and "surprise" when they realized their major was in CASNR.

Figure 1 is a graphic model of the respondents' descriptions of deterrents to enrollment

(Figure 1 Goes Here)

Implications

Hoover and Scanlon (1991) reported "approximately one-tenth of eleventh graders (in their study) not enrolled expressed an interest in an agriculture career and one-six of future non-enrollees expressed an agricultural career interest". It is important that the profession begin to understand what is deterring students with an interest in agriculture from entering the secondary program. The following model is the result of this methodological triangulation and should begin to shed light on deterrents to non-traditional student enrollment. The model is recommended as the strategy to transcend barriers to enrollment of non-traditional students into agricultural education.

(Figure 2 Goes Here)

At the junior high level a number of activities could be used to enhance the likelihood of female and male non-traditional enrollment. First of all, junior high exploratory agricultural education courses are a critical link in relating agricultural education curriculum to the wide range of agriculture careers. Most junior high agricultural education exploratory courses occur in the seventh and eighth grade, a time when students are beginning to sift and sort as they narrow in on the courses they will take in high school to prepare for a career. This process of sifting and sorting, our respondents say, comes to closure at the ninth grade.

Throughout the junior high experience the agricultural education instructor should be relating agriculture careers to college majors. Agriculture offers many diverse, exciting careers, and it should be marketed to students in this manner.

Career aptitude tests should be administered as the first step in a career awareness/education process that involves agriculture career fairs and in-class interaction with those established in agriculture careers. Students want the opportunity to ask questions of these individuals, attempting to move their knowledge of a career they are considering from an abstraction to something more concrete.

The counselor not only will be critical in career aptitude testing in this process but is also critical in providing career information to students. The counselor needs to be viewed as an ally to the agricultural education program rather than the enemy. Teaming with the counselor, instructors should offer their services as a resource for

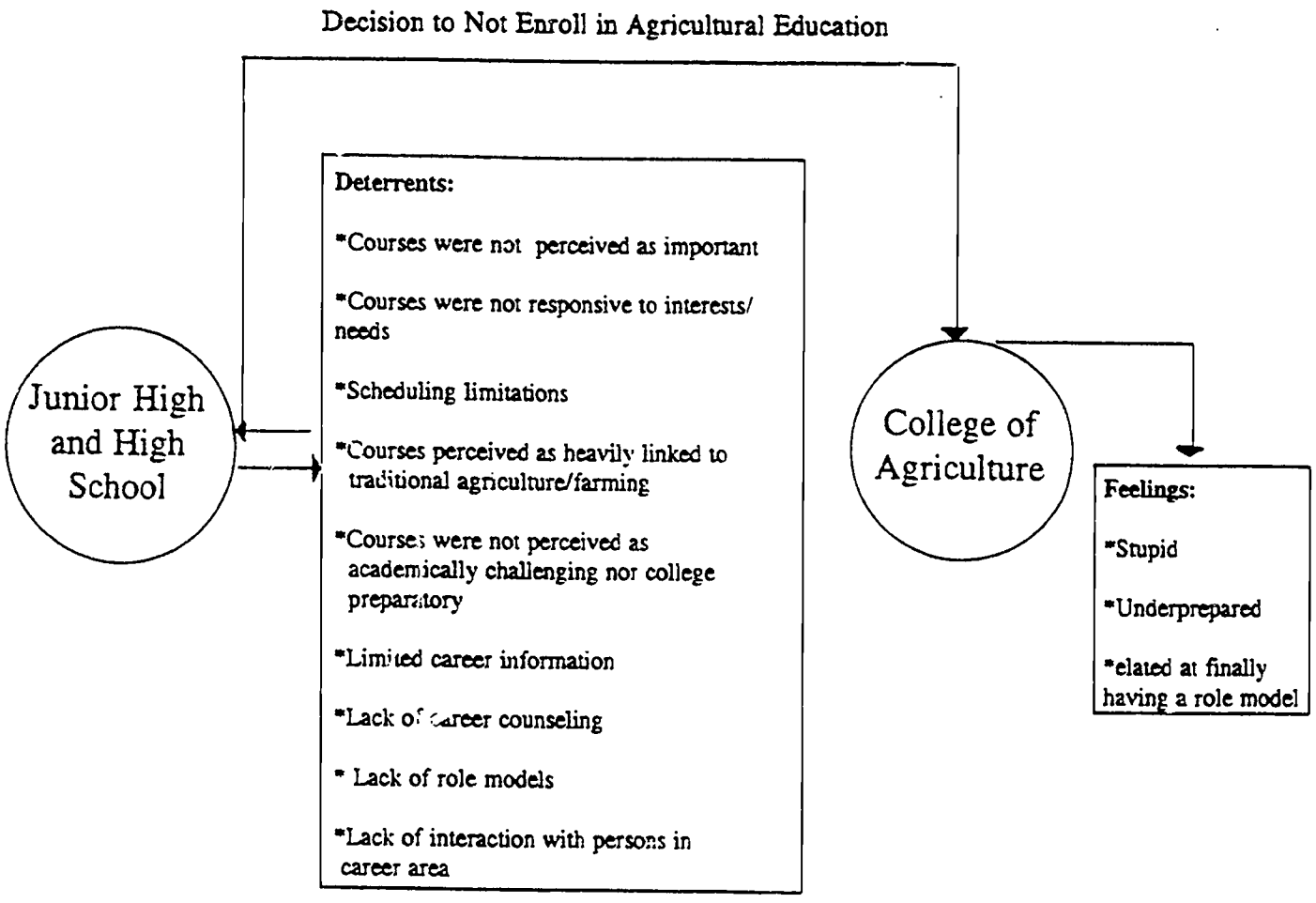

Figure 1. Deterrents to Enrollment

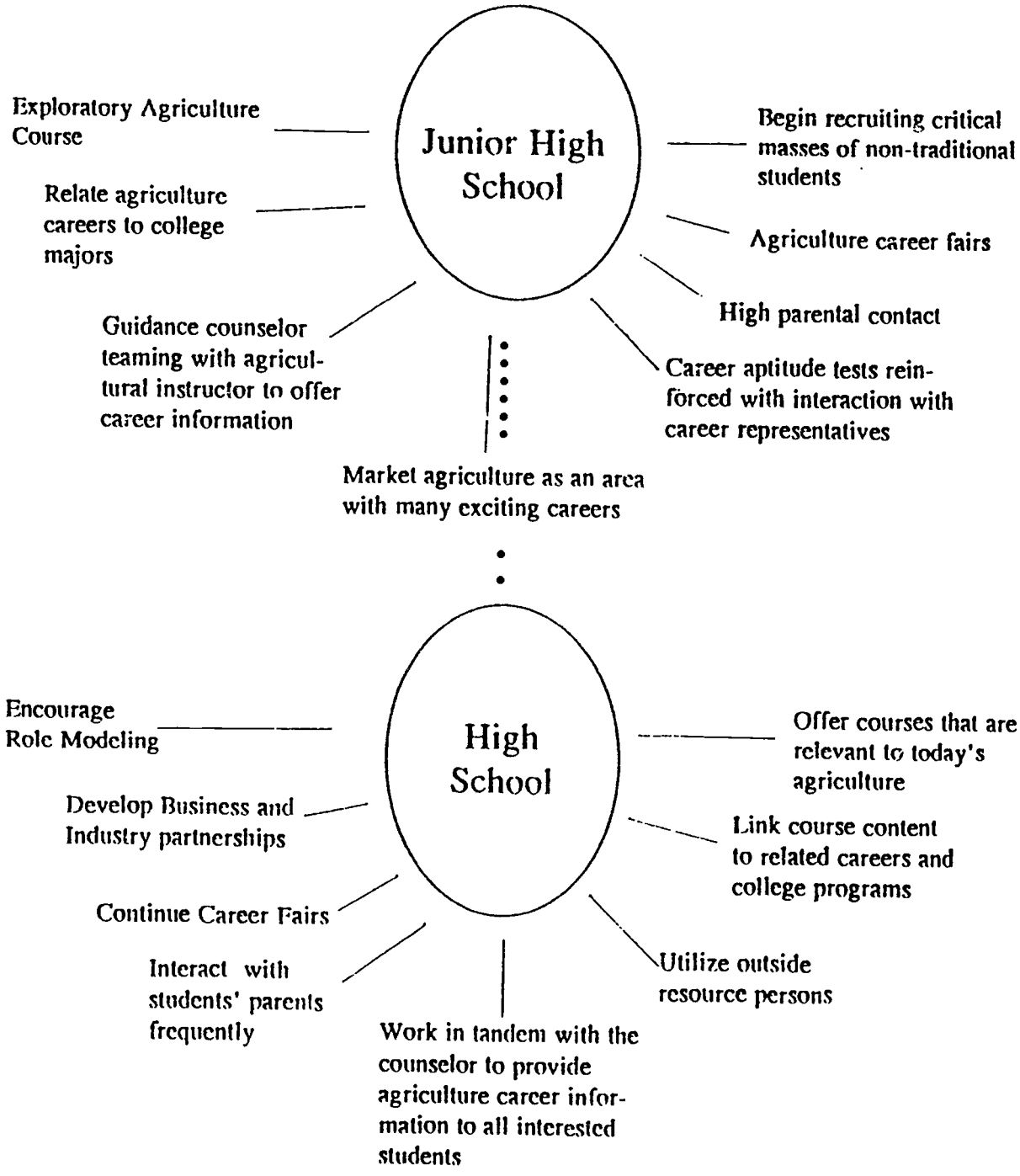

Figure 2. Strategies to Transcend Barriers to Enrollment

students wishing to gain more knowledge about agriculture careers.

Whenever possible, agricultural education instructors should unabashedly exploit opportunities to interact with parents of junior high students. This positioning will lend credibility to the instructor with both parent and student and may pave the way for future attempts at gaining career information.

At the high school level, instructors should reinforce career information with interaction of individuals in career areas. Frequent, liberal use of agriculture-related career professionals in agricultural education classes and other high school classes as a resource could blossom into some natural role modeling for interested students. School and business partnerships that are emerging in many school systems should be capitalized upon to involve ag-related professionals in the classroom on a regular basis.

Throughout the high school experience, the agricultural education teacher should continue to ally with the guidance counselor functioning as an additional resource for students who are asking about agriculture-related career information. Agriculture education teachers should be prepared to serve as an intermediary, linking students with post-secondary agriculture resource persons.

It is not only critical but also necessary that courses offered at the secondary level be relevant to today's agriculture. If students cannot associate courses with their specific interest in agriculture, the likelihood is that they will not enroll. Course content, as well, should be related to careers and college programs.

Further research should be conducted at other land grant institutions to test the model (Figure 1) that has been advanced as a result of this study.

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METHODOGICAL TRIANGULATION: AGRICULTURAL EDUCATION ENROLLMENT AND THE NON-TRADITIONAL STUDENT

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This study focused on the basic question of why students have elected to not enroll in agricultural education courses in high school but were enrolled in agricultural majors at the University of Nebraska-Lincoln. The study was interesting in that it is so timely and raises a concern the whole profession must deal with if it has any hope of making progress in changing attitudes and understanding about agriculture.

Although the paper was interesting, I am troubled by the lack of a more complete explanation of the procedures and methods used in this study. The ethnographic methods used in this study are slowly beginning to be fully appreciated by the profession, but it would help to have had them more fully explained. Also, the purpose and objectives of the study seemed unclear at the outset of the paper, although they became clearer as one read the paper further.

The theoretical framework of the study appeared to be weak. The review of literature was not extensive and did not provide much of a theory base for the study. The questions posed in this study were important and these questions certainly provided some interesting information regarding the approach the profession needs to take to encourage more students to enroll in agriculture.

It was unclear the extent to which the deterrents model was based solely on the six interviews or a combination of previous information and the interviews. The same could be said for the strategic model for dealing with the situation. This raises the question then of the need for the study.

The paper provides some focus and adds more information to the profession on a sensitive issue. The models are helpful. However, one could ask what is new here? What research has been done or should be done that goes beyond identification of the deterrents to enrollment in agriculture and tests the models for delivery of the strategies? The major question here is what are the researchers going to do now to test the model and the strategies? What should be the next step?

The researchers are encouraged to further their research efforts and add more specificity to their procedures. This is an important research topic but it must go beyond mere identification of the problems to the point of testing the models we develop.

AN ANALYSIS OF AGRICULTURAL MECHANICS SAFETY PRACTICES IN AGRICULTURAL SCIENCE LABORATORIES

by: Dr. Michael K. Swan, North Dakota State University

Introduction

Agricultural mechanics students are exposed to equipment, materials, and supplies that are potentially hazardous to their health and that could cause injury or death (Johnson & Fletcher, 1990). Instructional safety programs are a must and therefore should be of high priority to the instructor. The most important responsibility of the instructor is to ensure the safety of the students. It is essential that instructors provide a safe and healthy learning environment for students enrolled in these courses (Padham, 1990). Students in agricultural mechanics learn and pattern future work habits around conditions learned while enrolled in agricultural mechanics courses.

Studies have shown that students must develop more than acquired knowledge and skills in machine operation. Students must develop safe attitudes towards the work environment. Students should be taught that accidents happen and that accident causes can be pre-identified (Reynolds, 1980). Burke (1989) studied accident frequency and found that five student accidents per year per teacher was excessive. Burke concluded that safety instruction should be enhanced and that further studies be conducted. A 1990 study reported that accidents were happening at the rate of more than eight per year per instructor (Hoerner & Bekkum, 1990).

There is evidence that unsafe conditions are found in many agricultural mechanics laboratories. Studies have found that many instructors are not using recommended safety practices or providing safe learning environments (Johnson & Fletcher, 1990). It was noted that these instructors indicated that their preparation in safety practices was deficient in many areas. No current literature was found concerning the state of safety practices in agricultural mechanics laboratories located in North Dakota.

According to Jacobs and Turner (1981) and Storm (1979), 95 percent of all work-related accidents could be avoided if proper safety precautions were employed. Since agricultural mechanics laboratory safety is such an important priority for instructional programs, it was apparent that laboratory safety practices used by instructors needed to be examined.

Purpose and Objectives

The purpose of this study was to ascertain the safety practices currently being used in agricultural mechanics laboratories. A secondary purpose was to provide baseline data from which recommendations for safety program improvements and inservice training could be offered. Specific objectives were as follows:

1. to determine the instructional techniques employed by agricultural mechanics instructors in the agricultural mechanics safety program.

2. to determine instructional materials currently being used by agricultural mechanics instructors to teach laboratory safety.

3. to determine the safety and emergency equipment available in the agricultural mechanics laboratories.

Procedures

The population for this study was composed of all North Dakota secondary agricultural mechanics instructors employed in the 1991-92 academic year. The state supervisor of agricultural education and teacher educator in agricultural education developed a list of all instructors. The entire population (N=89) was surveyed. The data were collected via self-administered mailed questionnaires. The instrument developed by Hoerner & Kesler (1989) was modified to fit specific conditions of the population. The revised instrument consisted of two parts. Part one solicited relevant demographic information. Part two solicited information concerning instructional methods and materials, safety practices, and equipment used in the agricultural mechanics laboratory.

The revised instrument was examined by experts in agricultural engineering and agricultural mechanization and judged to be valid. To further ensure the validity of the instrument, it was pilot tested with students enrolled in an agricultural teaching methods course the spring of 1991. An analysis of the reliability of the instrument was determined to be r=.84 using Cronbach coefficient alpha at the .05 alpha level. The statistical computer program Statgraphics was used for data analysis. Descriptive statistics (means, standard deviations, and percentages) were used to describe the population of this study.

Findings/Results

Usable responses were received from 69 of 89 agricultural mechanics instructors for a 77.5% response rate. Comparison of early and late respondents on identified demographic variables, safety practices used, and safety and emergency equipment available revealed no significant difference ($p<.05$) existed. Therefore, the results were generalized to the population (Miller & Smith, 1983).

The composite instructor respondent had 10.5 years of teaching experience, had completed 8 quarter hours of college-level agricultural mechanics course work as an undergraduate, had liability insurance coverage in excess of $150,000 (79.6%), and had 13.1 students in his agricultural mechanics courses. The typical agricultural mechanics laboratory was 2000 square feet or more in size (60.1%) and

over 15 years old (75.5%). The typical agricultural mechanics instructor devoted 58.3% of his instructional time to teaching agricultural mechanics, felt somewhat prepared to very well prepared to provide safety instruction in agricultural mechanics (63.2%), and devoted 15.1% of his agricultural mechanics instructional time to safety related instruction.

When asked to record the number of major accidents (requiring medical attention) that occurred in the agricultural mechanics laboratory during the past five years, the mean response was 1.3 accidents per year. Instructors' reported the occurrence of minor accidents (requiring bandage but not doctor or nurse attention). During the same five year period, the mean number of accidents was 13.3 accidents per year. Four instructors reported 40 or more minor accidents, while 45 (65.2%) of the instructors indicated they did not maintain written accident report files.

Instructors were asked to identify instructional techniques used in their safety instructional program in agricultural mechanics. Table 1 lists the number and percentage of respondents who reported using each of the instructional techniques in their agricultural mechanics safety programs. The instructional techniques used most often were students demonstrating safe use of power tools and teachers conducting safety demonstrations on power tools (97.1%). The least used instructional technique was providing each student with a copy of appropriate safety laws (18.8%).

Table 1
Instructional Techniques Used by Agricultural Mechanics Instructors in the Agricultural Mechanics Safety Program (N=69)

Instructional Technique	Use Technique n	%	Do Not Use n	%
Students demonstrate safe use of power tools	67	97.1	2	2.9
Teacher conducts safety demonstrations - power tools	67	97.1	2	2.9
Students study safety subject matter	65	94.2	4	5.8
Student pass safety examinations	65	94.2	4	5.8
Teacher conducts safety demonstrations - hand tools	65	94.2	4	5.8
Students demonstrate safe use of hand tools	61	88.4	8	11.6
Students' safety examinations are filed	55	79.7	14	20.3
Clean up schedules are used by students	45	65.2	24	34.8
Unscheduled safety inspections are conducted	36	52.2	33	47.8
Scheduled safety inspections are conducted	25	36.2	44	63.8
Students each have a copy of appropriate safety laws	13	18.8	56	81.2

Agricultural mechanics instructors were asked to identify the instructional materials used in the safety instruction. Table 2 identifies manuals and booklets as the most commonly used instruction material (94.2%). The use of microcomputer programs was identified as the least used by respondents (24.6%).

Table 2
Instructional Materials used by Agricultural Mechanics Instructors in their Instructional Safety Programs (N=69)

Instructional Materials	Use Technique n	%	Do Not Use n	%
Manuals and booklets	65	94.2	4	5.8
Worksheets	59	85.5	10	14.5
Videotapes	53	76.8	16	23.2
Transparencies	49	71.0	20	29.0
Slides and filmstrips	42	60.9	27	39.1
16 mm films	24	34.8	45	65.2
Microcomputer programs	17	24.6	52	75.4

The safety equipment or materials which are available for student use in agricultural mechanics laboratories are listed in Table 3. The most commonly provided items of safety equipment are industrial quality eye protection and welding gloves (97.1%). The safety equipment or material provided least was steel toes shoes/boots (2.9%).

Table 3
Safety Equipment or Materials That Are Used or Available for Students in the Agricultural Mechanics Laboratory (N=69)

Safety equipment/materials	Not Available n	%	Available n	%
Industrial quality eye protection	67	97.1	2	2.9
Welding gloves	67	97.1	2	2.9
Shop coats or coveralls	59	85.5	10	14.5
Welding aprons or jackets	42	60.9	27	39.1
Dust masks	31	44.9	38	55.1
Hard hats	21	30.4	48	69.6
Hearing protection - ear plugs	14	20.3	55	79.7
Hearing protection - ear muffs	10	14.5	59	85.5
Respirators	10	14.5	59	85.5
Bump/Skull caps	4	5.8	65	94.2
Steel-toed shoes/boots	2	2.9	67	97.1

Table 4 identifies the safety practices, equipment or materials found agricultural mechanics laboratories. The most common practice, equipment or material found were

welding booths with screens/curtains and welding exhaust systems (97.1%). It should be noted that 4 respondents did not have fire extinguishers available and 8 respondents did not have fire alarms located in their laboratories. Panic buttons (14.5%) were the least frequently reported safety item reported. Less then half of the safety or emergency items identified in Table 4 were available in more than 70.0% of the respondents' agricultural mechanics laboratories.

Table 4
Safety Practices, Equipment or Materials Used in the Agricultural Mechanics Laboratory (N=69)

	Used		Not Used	
Safety practices, equipment, materials	n	%	n	%
Welding booths with screens/curtains	67	97.1	2	2.9
Welding exhaust system	67	97.1	2	2.9
Safety guards on all equipment	66	95.6	3	4.4
First aids kit/boxes	65	94.2	4	5.8
Fire extinguishers available	65	94.2	4	5.8
Fire alarm	61	88.4	8	11.6
Exits marked	59	85.5	10	14.5
Safety cans for flammable liquids	48	69.6	21	30.4
Safety rules posted near power tools	41	57.4	28	40.6
Safety poster posted near power tools	39	56.5	30	43.5
Safety cabinet for flammable /explosive materials	39	56.5	30	43.5
Vehicle safety stands available	39	56.5	30	43.5
Fire blanket	37	53.6	32	46.4
Safety zones around tools	27	39.1	42	60.9
Fume exhaust system	25	36.2	44	63.8
Eye safety laws/rules posted	24	34.8	45	65.2
Color-coded power tools	13	18.8	56	81.2
Non-skid areas around power tools	13	18.8	56	81.2
Eye wash	13	18.8	56	81.2
Panic button	10	14.5	59	85.5

Conclusions and Recommendations

The findings of this study are consistent with the results of similar studies in Missouri (Lamb, 1984), Nebraska (Rudolph & Dillon, 1984), Ohio (Gleim & Hard, 1988), Iowa (Hoerner & Bekkum, 1989), and Mississippi (Johnson & Fletcher, 1990). It is apparent that North Dakota secondary agricultural mechanics instructors are not using recommended safety practices or providing student safety and emergency equipment to the extent warranted by the hazards present in the agricultural mechanics laboratory.

The instructional techniques most commonly used in safety instruction were demonstrations conducted by students and instructors in the use of power tools. Passing of safety examinations was required by most instructors (94.2%).

Safety manuals and booklets and worksheets were the instructional materials most often used by agricultural mechanics instructors. Microcomputer programs related to safety were the least frequently used instructional material.

Industrial-quality eye protection and welding gloves were the most frequently available safety equipment for use by students. The most frequently available safety practices, equipment, or materials were welding booths with screens/curtains, welding exhaust system, safety guards on all equipment, first aid kits/boxes, fire extinguishers, fire alarms, and marked exits. These findings are consistent with the findings of similar studies (Hoerner & Bekkum, 1990; Johnson & Fletcher, 1990).

Based upon the results of this study, it is evident that unsafe conditions exist in many secondary agricultural mechanics programs in North Dakota. Safety program improvements must become an important priority for agricultural mechanics instructors and their administrators.

The following recommendations are based on the results of this study:

1. Inservice programs on agricultural mechanics safety should be conducted for agricultural mechanics instructors and should include local program administrators.

2. Instructor preparation programs should be examined to determine if additional emphasis should be placed on safety instruction in laboratories.

3. Safety topics should be identified and taught during both preservice and inservice educational programs.

4. Local and federal funds should be earmarked for use in improving the safety and emergency equipment available to instructors and students.

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AN ANALYSIS OF AGRICULTURAL MECHANICS SAFETY PRACTICES IN AGRICULTURAL SCIENCE LABORATORIES

A Critique by
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The review of literature certainly documents the need for additional insight into the agricultural mechanics phase of secondary Agricultural Education curriculum.

The objectives of the study are well stated and focused. The procedures were well explained and deemed appropriate for a study of this nature. The baseline data developed will provide important information for pre-service and in-service educational programs.

It was interesting to note that 65.2% of the instructors indicated that they did not maintain written accident report files. This many indicate a significant area for in-service and /or pre-service education.

Three findings stand out; the level of liability insurance coverage, percentage of the instructional time devoted to teaching agricultural mechanics, and the fact the 15.1% of the agricultural mechanics instructional time was devoted to safety related instruction. Eye safety has been the predominant safety feature in the agricultural mechanics laboratory and again, though not perfect, reflects a concerted effort by the teaching profession.

The most significant finding in this study is the fact that 97.1% of the students demonstrate safe use of power tools. If this activity is in fact, students demonstrating the safety skills back to the instructor, teachers are indeed aware of the middle component to ensuring power tool safety; namely, guided practice which fills the void between demonstration and safety examinations. The three prong approach to laboratory safety; teacher demonstrations (97.1%), students demonstrating safe use of power tools (97.1%), and the administration of safety examinations (94.2%) may not be perfect but represents a sincere effort on behalf of the profession to possessing a deep concern about safety in the agricultural mechancis laboratory.

It is interesting to note that many of the safety or emergency items, that were reported as being utilized at less than 70%, are relatively inexpensive items and could be easily rectified.

This study contributes to the knowledge base of agricultural mechanics laboaratory instruction as the findings are consistent with results of similar studies.

ACCIDENTS AND ACCIDENT PREVENTION IN VOCATIONAL EDUCATION LABORATORIES

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Introduction

"When public school administrators first undertook the obligation of providing shop and laboratory experiences for youth and adults enrolled in their schools, they assumed a responsibility to provide an accident-free environment and a program of instruction which would include emphasis on effective safety practices," (Williams, 1975, p. 50). "A positive attitude toward skill development is a prerequisite to the safety of an individual. The teacher is responsible for promoting desirable attitudes that assist pupils in developing a proper respect for safety regulations" (Kigin, 1983, p. 93). Similarly, Harper and McCracken (1984) recommended that "teachers should work towards demonstrating a positive safety attitude, a sound knowledge of safety, and maintain school facilities in safe working conditions" (p. 10).

As school curricula have expanded to include more occupational and technical subjects, the potential for situations that contribute to accidents has increased (Kigin, 1983; Ramp, Johnson, & McLuckie, 1975). What are schools doing to ensure a safe environment for students? In a survey of administrators and vocational teachers in Missouri, Dyrenfurth and Lindhart (1981) found that classroom and laboratory instruction were most often cited as the major safety program activities.

Agricultural education researchers (Bruening, Hoover, & Radhakrishna, 1991; Fletcher & Johnson, 1990) have surveyed agricultural mechanics teachers to determine the extent to which selected safety practices were utilized and to determine the availability of selected safety materials and equipment. Although teachers have the primary responsibility for ensuring the safety of vocational students, teachers will have difficulty meeting this responsibility without the support of school administrators. Bear (1980) wrote that " safety programs will happen when the administrator supports them and will cease when the interest and attention has been eliminated or become lax" (p. 76). Additionally, McMahon (1975) wrote that "... the single most effective force behind the development of a viable, overall safety program is the support of an administrator who accepts its importance and by his own attitude encourages a safety consciousness throughout his administrative unit" (p. 18). Even so, teachers have expressed the opinion that administrators give only lip service to school safety issues (Bear, 1980). Therefore, it becomes important to use administrators as the subjects of safety investigations.

What are the potential consequences of neglecting the safety needs of occupational programs? Connors (1981) wrote that "we do live in a litigious society, and educators as public servants are increasingly frequent targets of litigation" (p. ix). Additionally, many schools no longer have sovereign immunity and may be held liable for accidents in negligence suits (Godbey, 1979; La Morte, 1990). Therefore, it is increasingly important for educators to properly maintain equipment, provide instruction in safety, and adequately supervise students engaged in laboratory activities (Connors, 1981). Although the threat of injury and litigation are real, there is a need for objective data to assess the magnitude of the threat.

Purpose and Objectives

The purposes of this descriptive correlational study was to investigate the safety policies and procedures used by administrators in comprehensive high schools with agricultural education programs and to investigate the utilization of accepted safety practices, the availability of safety materials and equipment, the prevalence of accidents, and the extent to which schools have been engaged in litigation resulting from student injury. The research objectives were to:

1. Describe selected safety policies of administrators in comprehensive high schools with agricultural education programs.
2. Describe selected procedures followed by administrators in comprehensive high schools with agricultural education programs to insure safety in vocational programs.
3. Describe safety practices used by vocational teachers in comprehensive high schools with agricultural education programs as reported by school administrators.
4. Describe what safety materials and equipment are available in vocational laboratories in comprehensive high schools with agricultural education programs.
5. Describe and compare the number of accidents resulting in student injury by location over a two year period in comprehensive high schools with agricultural education programs.
6. Determine the number of lawsuits brought against educators as a consequence of school accidents over a two year period that were settled in favor of students and the amount of settlement.
7. Determine the number of schools providing liability insurance for faculty members and the average amount of coverage.
8. Describe relationships among selected indicators of safety and the number of accidents occurring in vocational laboratories.

Procedures

The population for this descriptive survey included all principals of comprehensive high schools with agricultural education programs in Ohio (N = 260). The Ohio Directory of Agricultural Education was utilized to develop the list of comprehensive high schools with agricultural education programs. Based upon Krejcie and Morgan's (1970) formula for a 5 % margin of error a random sample of 155 schools was drawn.

The questionnaire utilized in this study was developed by the researchers. The questionnaire consisted of three parts: 1) administrator's safety attitude, 2) policies, and 3) facilities and inspection. Content and face validity were established by a panel of experts consisting of faculty and graduate students in the departments of Agricultural Education and Agricultural Engineering at The Ohio State University. Cronbach's Alpha was used to assess the reliability of part one (The Administrators' Safety Attitude) of the questionnaire. The reliability coefficient was .73. Since items in parts two and three requested factual responses, reliability was not estimated.

The questionnaire along with a cover letter and stamped return envelope were sent to all principals of comprehensive high schools with agricultural education programs included in the sample. Approximately four weeks after the initial mailing a second complete package including the questionnaire, a cover letter, and a stamped return envelope was sent to all non-respondents. The response rate was 83%. Non-response error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between early and late respondents. Although each package was addressed to the principal, some of the respondents were vocational administrators. Therefore, respondents were referred to as administrators.

Analysis of Data

All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for description (frequencies, percents, means, standard deviations, Pearson correlations, and Spearman correlations) and inference (repeated measures analysis of variance and the Tukey post-hoc procedure) were used. The alpha level was set *a priori* at .05. All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

Results

Table 1 indicates that 58.6% (75) of the administrators surveyed considered themselves to be competent in determining whether or not vocational laboratories were safe while 41.4% (33) of the administrators perceived themselves as not being competent in this area.

Table 1 Administrators' Perceptions of Their Own Competence in Determining What Constitutes a Safe Vocational Laboratory

Perception	n	%
Competent	75	58.6
Not Competent	33	41.4

Table 2 displays the administrators' perceptions regarding the ability of vocational teachers in their school to provide instruction in safety. Administrators in 74% (94) of the schools perceived vocational teachers as being very well prepared to provide instruction in safety while another 22.8% (29) perceived vocational teachers to be moderately well prepared. Only .8% (1) of the administrators perceived vocational teachers in their schools to be poorly prepared to provide safety instruction.

Table 2 Administrator's Perceptions Regarding the Ability of Vocational Teachers to Provide Instruction in Safety

Extent of Preparedness	n	%
Very well prepared	94	74.0
Moderately prepared	29	22.8
Somewhat prepared	3	2.4
Poorly prepared	1	0.8

Tables 3 and 4 show the number of administrators who inspect vocational laboratories for safety and sources of information used for these inspections. Table 3 shows that 78.7% (100) of the administrators personally inspect vocational laboratories. Table 4 shows that most (82.3%) administrators obtain safety information from teacher educators. In addition, more than half of the administrators utilize information provided by the State Department of Education and the Ohio Department of Safety.

Table 3 Whether or Not Administrators Inspect Vocational Laboratories for Safety

Inspection	n	%
Yes	100	78.7
No	25	19.7

Table 4 Sources of Information Utilized by Administrators in Making Safety Inspections

Source	n	%
Teacher educators	102	82.3
State Department of Education	82	66.1
Ohio Department of Safety	67	54.0
Other Sources	38	30.9

Table 5 displays administrator responses regarding the responsibility for repair and maintenance of equipment in vocational laboratories. Teachers were responsible for repair and maintenance of equipment in 92% (115) of the schools. Janitors and outside contractors were responsible for repair and maintenance of equipment in 62.1% (77) and 63.7% (79) of the schools respectively. Other persons performed repair and maintenance on equipment in 30.6% (37) of the schools. When asked to specifically name other persons responsible for repair and maintenance of equipment, administrators in 26% (33) of the schools listed school maintenance personnel.

Twenty nine percent (37) of the administrators indicated that vocational teachers were required to have training in first aid (Table 6). Table 6 further shows that 82.3% (102) of the administrators surveyed maintain written policies on safety. Administrators in 79.2% (99) of the schools indicated that handicapped students participate in vocational laboratory instruction, but only 68.4% (67) of the administrators indicated that special provisions were made for the safety of handicapped students (Table 6).

Table 5 Persons Responsible for Repairing and Maintaining Equipment in Vocational Laboratories, As Reported by Administrators

Person Responsible	n	%
Teachers	115	92.0
Janitors	77	62.1
Outside Contractors	79	63.7
Other	37	30.6

Table 6 Existence of Selected Safety Policies as Reported by School Administrators

Policy	n	%
Require teacher training in first aid	37	29.1
School maintains written safety policies	102	82.3
Handicapped students participate in vocational laboratory instruction	99	79.2
Special provisions made for the safety of handicapped students	67	68.4

Administrators in 100% (128) of the schools indicated that teachers instruct students in how to properly use equipment and demonstrate proper use of equipment. Additionally, vocational teachers in 97.7% (125) of the schools give an equipment test to students (Table 7).

Only 46.1% (59) of the administrators reported that pupils were required to sign a safety checklist. Additionally, administrators in 57.1% (72) of the schools reported that vocational teachers permit only one dangerous activity at a time and closely supervise it. According to administrators, vocational teachers never leave the shop while students are using equipment or chemicals and evaluate pupils every year regarding proper use of equipment in 84.4% (108) of the schools (Table 7).

Table 7 Teacher Safety Practices

Practice		f	%
1.	Maintains equipment.	127	99.2
2.	Instructs pupils in how to properly us equipment.	128	100.0
3.	Gives pupils an equipment test.	125	97.7
4.	Makes sure that pupils understand what is wrong with incorrect answers on the equipment test.	115	89.8
5.	Demonstrates proper use of equipment.	128	100.0
6.	Each student demonstrates proper use of equipment in the presence of the teacher.	116	90.6
7.	Evaluates each pupil every year regarding proper use of equipment.	108	84.4
8.	Enforces the constant use of safety glasses when appropriate.	126	99.2
9.	Requires pupils to dress appropriately for each activity.	121	95.3
10.	Requires pupils to sign a safety checklist each year.	59	46.1
11.	Balances the danger of an activity against its educational value.	112	88.2
12.	Only permits one dangerous activity at a time and and supervises it closely.	72	57.1
13.	Does not allow pupils to use unsafe equipment.	125	97.0
14.	Never leaves the shop while students are using equipment or chemicals.	108	84.4
15.	Stresses safety above all else.	114	89.1

More than 90% of the administrators reported that the following safety materials and equipment were available in their schools' vocational laboratories; fire extinguishers, exits marked, fire alarm, and safety guards on all equipment (Table 8). On the other hand, fewer than 50% of the administrators reported the availability of the following safety materials and equipment in their vocational laboratories; color coded power tools, non-skid areas around power tools, fire blanket, safety cabinets for explosive materials, and vehicle safety stands (Table 8).

Table 8 Safety Materials and Equipment Available in Vocational Laboratories

Item		f	%
1.	Safety zones around power tools.	95	74.2
2.	Color coded power tools.	42	33.6
3.	Non-skid areas around power tools.	26	20.8
4.	Safety rules posted near power tools.	107	85.6
5.	Ohio eye safety law posted.	90	71.4
6.	First aid kit.	111	88.1
7.	Fire blanket.	62	49.2
8.	Fire alarm.	119	94.4
9.	Exits marked.	122	96.8
10.	Safety cabinets for explosive materials.	58	46.4
11.	Safety cans for flammable liquids.	86	68.3
12.	Safety guards on all equipment.	116	92.8

13.	Fire extinguishers.	123	97.6
14.	Welding exhaust system.	104	83.2
15.	Welding booths have screens/curtains.	107	85.6
16.	Vehicle safety stands.	47	37.9

The average number of accidents resulting in student injury occurring in vocational laboratories over a two year period was 1.5 with a standard deviation of 2.35 (Table 9). Table 9 further shows that three or fewer accidents resulting in student injury occurred in 90% of schools over a two year period.

Table 10 compares the number of accidents resulting in student injury over a two year period by location. On average, administrators reported 1.5 accidents in vocational laboratories, 4.96 accidents in physical education courses, .39 accidents in science laboratories, and .87 accidents in other areas (i.e. classrooms, hallways, cafeteria, and stairs). Repeated measures analysis of variance and the Tukey post hoc procedure revealed that the number of accidents in physical education courses was significantly greater than the number of accidents occurring in vocational laboratories, science laboratories, and other areas.

Table 9 Vocational Laboratory Accidents Resulting in Student Injury Over a Two Year Period

No. of Accidents	f	%
0	57	47.5
1	15	12.5
2	27	22.5
3	9	7.5
4	4	3.3
More than 4	8	6.7

Mean 1.5 Std. Dev. 2.35

Table 10 Number of Accidents Resulting in Student Injury Over a Two Year Period by Location

	Voc. Labs	P. E. Classes	Science Labs	Other Locations	F	p
Mean	1.50[a]	4.96[b]	.39[a]	.87[a]	33.83	001*
St.Dev.	2.36	6.19	.88	2.98		

Note. Means with different letters differ significantly.

Further analysis revealed that accidents occurring in vocational laboratories, physical education classes, science laboratories, and other areas accounted for 22.36%, 65.29%, 3.60%, and 8.75% of the total number of school accidents respectively.

Of those administrators providing useable data, 4% (4) reported that one lawsuit had been filed as a result of school accidents occurring over the last two years. Two lawsuits were decided in favor of students. One settlement was for $150,000 while the other was for $500,000.

Of those administrators providing useable data, 82.4% (103) indicated that their school provided liability insurance for faculty. Of the schools providing liability insurance 78.1% (75) had policy amounts in excess of $200,000 (Table 11).

Pearson correlations and Spearman correlations were calculated to describe relationships between selected indicators of safety in vocational

laboratories. Coefficients ranged in magnitude from negligible to moderate. The administrators' perception of vocational teachers' preparedness to provide safety instruction was significantly related to the administrators' safety attitude, and the administrators' competence in determining whether or not a vocational laboratory is safe. Furthermore, the administrators' safety attitude was significantly related to the number of safety materials and equipment available, and the number of teacher safety practices utilized. Additionally, the administrators competence in determining whether or not a vocational laboratory is safe was significantly related to the number of safety materials and equipment available and whether or not administrators inspect vocational laboratories for safety. The number of accidents occurring in vocational laboratories was not significantly related to any of the selected indicators of safety (Table 12).

Table 11 Liability Insurance for Faculty Members

Policy Amount	f	%
$25,000 to $49,999	1	1.0
$50,000 to $99,999	4	4.2
$100,000 to $149,999	14	14.6
$150,000 to $199,999	2	2.1
More than $200,000	75	78.1

Table 12 Relationships Among Selected Indicators of Safety in Vocational Laboratories

	Intercorrelations						
Variables	X1	X2	X3	X4	X5	X6	X7
Vocational Teacher (X1) preparedness to provide safety instruction.	1.00	.24*	.13	.18	.01	.20*	.10
Administrators' safety (X2) attitude.		1.00	.22*	.31*	.04	.06	.09
Number of safety materials (X3) and equipment available.			1.00	.10	-.01	.22*	-.04
Number of teacher safety (X4) practices utilized.				1.00	-.05	.09	-.14
Administrators' inspect (X5) facilities for safety.					1.00	.26*	-.18
Administrator competence in (X6) determining whether a vocational laboratory is safe.						1.00	-.18
Number of accidents in (X7) vocational laboratories.							1.00

* $p < .05$

CONCLUSIONS AND/OR RECOMMENDATIONS

Safety is important to administrators. Teachers should be aware of the expectations that administrators have regarding safety in vocational

education. It is recommended that the results of this study be shared with preservice and inservice teachers so that they might understand the importance of safety to school administrators.

Most administrators inspect vocational education facilities, and 82.3% depend upon the knowledge and expertise of teacher educators in making safety inspections of vocational laboratories. Additionally, most of the administrators felt competent in determining what constitutes a safe vocational laboratory. Teacher educators in vocational programs should disseminate current safety materials to high school administrators, and provide workshops for administrators interested in upgrading their safety knowledge.

Administrators expect vocational teachers to repair and maintain equipment in vocational laboratories. It is recommended that preservice teacher preparation programs ensure that prospective teachers have the knowledge and skill needed to repair and maintain equipment in vocational laboratories. Furthermore, staff development activities should be planned for vocational teachers needing to upgrade their safety knowledge and equipment maintenance skills.

Administrators in most schools report that handicapped students are assigned to vocational classes. While most administrators reported that special provisions were made for the handicapped students, 31.6% indicated that no such provisions were made. Both administrators and teachers must be aware of the special needs of handicapped students enrolled in vocational programs. Efforts should be made to insure that educators are knowledgeable of the special needs of handicapped students and are capable of dealing with them in vocational laboratory settings.

According to school administrators, vocational teachers use many of the safety practices espoused in the literature on laboratory safety. Most encouraging is the fact that all administrators reported that vocational teachers instruct pupils in how to properly use equipment and demonstrate proper use of equipment. There remains room for improvement on other teacher safety practices, however. Teacher educators should make certain that preservice teachers appreciate the importance of each practice, and develop ongoing strategies for reinforcing the use of these safety practices by practicing teachers.

The nonexistence of several safety materials and/or equipment in many vocational laboratories is discouraging. For example, approximately 12% of the administrators reported that first aid kits were not available in vocational laboratories. Additionally, many inexpensive safety materials (color coded power tools, safety zones around power tools, and safety cans for flammable liquids) were not available in some schools. Other materials and/or equipment (safety guards on equipment, welding exhaust systems, and safety cabinets for explosive materials) were not available in some schools.

The administrators' attitude toward safety was significantly related to both the number of safety materials and equipment available and the number of teacher safety practices utilized. Therefore, it becomes important that efforts be made to create more positive safety attitudes in public school administrators. Administrators must be convinced of their legal and moral obligation to provide for the safety of students and teachers under their supervision.

Vocational education laboratories are relatively safe when one considers the nature of the laboratory environment. On average, administrators reported less than one vocational laboratory accident per year that resulted in student injury. On the other hand, vocational accidents accounted for more than 20% of the total number of school accidents which is considerably more than the 9% estimate made by Ramp et. al. (1975).

Over a two year period only four lawsuits were filed of which two were settled in favor of students. The fear of negligence suits may be exaggerated. Even so, teachers in 82% of the schools were provided liability insurance and most policies amounts were in excess of $200,000. One should consider the possibility that liability insurance may actually encourage lawsuits. La Morte (1990) wrote that "although a strong case

for liability may be made against them, impecunious and uninsured educators are unlikely candidates for suit" (p. 403).

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ACCIDENTS AND ACCIDENT PREVENTION
IN VOCATIONAL EDUCATION LABORATORIES

A Critique
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The topic presented is a very timely topic. As the introduction noted, we live in a very legalisitic society and it appears that one cannot protect themselves enough in the classroom in an attempt to stay out of the courtroom.

The reliability of the survey instrument was evaluated and part one found to be satisfactory. Parts two and three were not subjected to a reliability check.

A response rate of 83% was exceptionally high which may be an indication that the principals surveyed were sincerely interested in the topic. The authors compared the early and late responses and found no significant difference in types of responses. The researchers were careful to note that some of the respondents were infact vocational administrators which may account for the high return rate.

The discussant is impressed with the detailed records school administrators had access to in compiling the request for numbers of school accidents within the last two years. The researchers may well have known the type of school accident records required by the State of Ohio and focused on securing the data.

It was determined that over 82% of the Ohio schools surveyed provided liability insurance for their faculty. This fact alone reflects the value of this study. It was interesting to note that over 82% of the administrators relied on teacher education for advice in the area of laboratory safety.

One cannot over emphasize the need to incorporate this information into in-service and pre-service training. This study documents the need for this type of information to be at the forefront of information to be presented to those in the field and individuals who will be teaching in the near future.

The key result in this study is the fact that teachers use equipment properly and demonstrate proper use of equipment. A question is raised on the point of improvement in the area of other teacher safety practices. The study could reveal areas in which the profession must concentrate in educating the current and next generations of teachers.

VARIABLES INFLUENCING UNDERGRADUATE STUDENTS' POSITIVE AND NEGATIVE ATTITUDES TOWARD COMPUTERIZED INTERACTIVE VIDEODISC INSTRUCTION IN HORTICULTURE

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Introduction

The use of interactive videodisc as an instructional strategy is increasing in training and education programs. Fletcher (1989) reviewed research on interactive videodisc instruction applied in defense training, industrial training, and higher education. Fletcher reported that interactive videodisc instruction improved academic achievement in all settings. Florell and Nugent (1985) indicated the advantages of the videodiscs in Extension programs were ease of use, technical quality, durability, and speed. Leonard (1989) reported that videodisc instruction gave more experimental and procedural options and more efficient use of time than the conventional mode. Leonard (1992) found that an interactive computer/videodisc learning approach was significantly more efficient than a traditional laboratory approach for learning biology concepts and science process skills. Ebner et al. (1984) found that students using videodisc did not learn more but learned the content faster and retained the information longer.

Attitudes toward instructional approaches are dependent on the kind of experience individuals have with an instructional device (Mathis, Smith, & Hansen, 1970). The term attitude is defined as a system of a person's cognitions, feelings, and action tendencies with respect to the various objects in his/her world (Krech, Crutchfield, & Ballachey, 1962). Therefore, the attitudes of learners at the onset of their computerized videodisc instruction may very well affect their success in future computer programs. Rushinek, Rushinek, and Stutz (1985) reported that interactive videodisc users' performance was closely related

to their attitudes toward interactive software. Shih (1989) found that Taiwanese college students' attitudes toward computer-assisted instruction correlated with their knowledge of interactive videodisc. However, O'Neill (1989) concluded that attitudes toward interactive videodisc were not related to achievement. Russell (1988) concluded that an interactive videodisc system was effective as an instructional method for cognitive achievement and as a method of preparing students for clinical performance. Schaffer (1987) reported that women had a significantly more positive attitudes toward interactive videodisc than men.

Attitude change results from exposure to additional information, changes in the group affiliations of the individual, enforced modification of behavior toward the object, and procedures that change personality (Krech, Crutchfield, & Ballachey, 1962; Russell, 1983). These changes will bring the person to a state of action. Krech, Crutchfield, and Ballachey (1962) explained that there are two types of attitude changes: incongruent and congruent. Incongruent change is a radical change toward the "sign opposite" but congruent change is a change in the same direction of the sign of the existing attitude. In an attempt to create positive attitudes and better prepare students for a computerized society, many educational systems have introduced computer education programs into their curricula (Levin & Gordon,1987). Wilkinson (1991) reported that clerkship students who used an interactive videodisc (IVD) increased their attitudes toward IVD experience. Wilkinson also found that learning style was not related to changes in attitude toward interactive videodisc instruction.

Leonard (1989) recommended that much more needs to be learned about the thought processes employed by users of high-technology instruction, about what factors motivate or discourage users, and about what concepts or skills can be best taught using sophisticated media such as interactive videodisc. These issues will become increasingly important with the proliferation of microcomputers as well as computer-assisted videodisc instruction. However, there were no studies that examined what aspects of the learning experiences might influence positive and negative attitudes toward using computerized interactive videodisc instruction. In this technological age, agricultural educators need information about what influences students' positive and negative attitudes toward interactive videodisc.

Purpose and Objectives

The purpose of this exploratory study was to identify variables that were associated with students' positive and negative attitudes toward interactive videodisc instruction. Specifically, the objectives addressed were:

1) To determine if the average discriminant scores for students with positive attitudes toward IVD differ significantly from those with negative attitudes.

2) To determine what variables are associated with students who have positive attitudes and with those who have negative attitudes toward IVD.

3) To determine what proportion of the variance in the discriminant score (attitude toward IVD) can be explained by the discriminating variables.

4) To determine the proportion of the students that can be correctly classified as having positive or negative attitudes toward IVD.

Methods

The population for this study was all undergraduate students who completed a horticulture class on identification of woody landscape plants during spring of 1992 (N=45). This research used one group pretest-posttest design. The pretest and posttest scores on attitude toward CIVI were compared.

Four computerized interactive videodisc modules about woody landscape plants were developed. These modules covered maples, oaks, viburnums, dogwoods, and hawthorns. These programs were developed using a Macintosh IIX computer with a hard disc and either "Hypercard" or "Course of Action" as the software. These programs were pilot-tested during 1991.

The researchers developed a Likert type attitude instrument (consisted of 25 items) in order to measure the perceived attitudes of undergraduate students toward computerized interactive videodisc instruction before and after videodisc exposure. A panel of experts was used to establish content and face validity. The researchers calculated a Cronbach alpha reliability coefficient and found it to be .85. They also developed a semantic differential instrument to measure students' perceived attitudes toward horticulture. The reliability for the 10 pairs of adjectives had a Cronbach alpha coefficient of .89. The last instrument measured subjects' opinions about the computerized interactive videodisc modules on identification of woody landscape plants. This instrument consisted of 22 Likert type items and had a Cronbach alpha coefficient of .90.

Data were collected by using the three instruments described above. Additionally, 13 questions about the background characteristics of the respondents were used. The instruments were administered at the beginning and end of the class.

For the analysis of data, the respondents were divided into three groups (Negative, Positive, or No Change) based on difference in scores between pretest and posttest on the attitude scale toward CIVI. Those students who had pretest scores larger than posttest scores (N=18) were designated as having a negative change. Those students who had posttest scores larger than pretest scores (N=23) were designated as having a positive change. Those students who had the same scores on the pretest and posttest (N=4) were designated as having no change. The analysis did not consider the "no change group" because the size of the smallest group should be no less than the number of variables used (Norusis, 1988). The data were analyzed using the SPSS/PC+ (Statistical Package for the Social Science). The specific statistical technique used was discriminant analysis. All correlation coefficients were interpreted using Davis' (1971) descriptors. An alpha level of .05 was established a priori for determining significant differences.

Results

An examination of differences in means and standard deviations of discriminating variables for both negative and

Table 1

Means and Standard Deviations for Discriminating Variables

Discriminating Variable	Group				
	Negative Change (n=18)		Positive Change (n=21)		
	Mean	Std.	Mean	Std.	
Gender[1]	.83	.38	.52	.51	*
Hours studying per week	4.25	2.03	7.17	4.34	*
Computer experience[2]	4.50	.86	3.76	1.48	
Learning objective[3]	.61	.98	.38	.50	
Preferred teaching method[4]	.39	.50	.71	.46	*
Type of course[5]	1.00	.00	.81	.40	
Final grade of the class[6]	2.46	.93	2.57	.81	
GPA[7]	4.72	.57	5.00	.77	
Attitude toward horticulture[8]	52.78	9.94	58.95	5.35	*
Evaluation on CIVModules[9]	81.06	9.81	83.62	10.05	
Horticulture classes taken [10]	.67	.91	.86	1.59	
Major[11]	1.00	.00	.76	.44	*
Class standing[12]	.39	.50	.24	.44	

* F-test Significant at the p<.05 level.

1= male 1, female 0; 2= never 1, very little 2, little 3, some 4, a lot 5; 3= To learn ID skills of plants 1, others 0; 4= lecture & lab 1, others 0; 5= required 1, elective 0; 6= A^+ 4.0 - C^- 1... 7= (below 1.0) 1, (1.0-1.49) 2, (1.5-1.99) 3, (2.0-2.49) 4, (2.5-2.99) 5, (3.0-3.49) 6, (3.5 or more) 7; 8= positive 7 - negative 1; 9= SA 5, A 4, U 3, D 2, SD 1; 10= one or more 1, none 0; 11= landscape 1, others 0; 12= senior 1, others 0.

positive attitude change groups (see Table 1) revealed that students with a positive change spent significantly more time studying per week, preferred instruction that combined lecture with lab exercises, and had higher scores on their attitude scale toward horticulture. Students who had a negative change tended to be males and majored in landscape architecture.

Table 2

Pooled Within-Groups Correlation Matrix: Discriminating Variables (n=39)

Variables	X1	X2	X3	X4	X5	X6	X7
Gender (X1)	1.00						
Hours studying/week (X2)	.13	1.00					
Computer experience (X3)	.15	-.54	1.00				
Learning objective (X4)	.28	.05	.16	1.00			
Preferred teaching method (X5)	-.08	-.04	.05	.15	1.00		
Type of course (X6)	-.19	-.11	-.07	-.18	-.21	1.00	
Final grade of the class (X7)	.08	.13	.00	.01	.21	-.18	1.00
GPA (X8)	-.07	.06	-.17	-.26	.24	.00	.34
Attitude toward Hort. (X9)	.06	-.32	.31	-.12	-.38	.08	.11
Evaluation on CIVModules (X10)	.15	.07	-.08	.22	.02	.09	-.02
Horticulture class taken (X11)	.29	.14	.07	.13	-.11	-.52	.43
Major (X12)	-.07	-.37	.12	-.23	-.08	.58	-.28
Class standing (X13)	.20	.04	.13	.37	-.16	-.20	.53

(Continued: Table 2)

Variables	X8	X9	X10	X11	X12	X13
GPA (X8)	1.00					
Attitude toward horticulture (X9)	-.27	1.00				
Evaluation on CIVModules (X10)	-.01	-.04	1.00			
Horticulture class taken (X11)	-.05	.26	.11	1.00		
Major (X12)	.12	.20	-.05	-.56	1.00	
Class standing (X13)	-.26	.34	.16	.61	-.33	1.00

Table 2 reports the pooled within-groups correlation matrix, obtained by averaging the separate covariance matrices for all groups and then computing the correlation matrix. The convention by Davis (1971) was used to describe the correlations. There were substantial relationships between computer experience and self-studying hours (r=-.54), type of course and number of horticulture classes taken (r=-.52), major and type of course (r=.58), class standing and final grade of the class (r=.53), major and number of horticulture classes taken (r=-.56), and between class standing and number of horticulture classes taken (r=.61). The ten combinations of discriminating variables showed moderate correlations (with absolute r values between .30 and .49). Thirty-seven other combinations of discriminating

variables showed low correlations (with absolute r values between .10 and .29).

The summary data for the discriminant analysis were reported in Table 3. The hypothesis tested with discriminant analysis was that "In the populations from which the samples were drawn there was no difference between the two group means (centroids) on the discriminant scores." This hypothesis was rejected at p<.004. The discriminant function explained approximately 63% of the variance in whether students had positive and negative attitudes toward computerized interactive videodisc instruction.

Table 3

Summary Data for Discriminant Analysis (n=39)

Variables	b	s	Discriminant Function1 Group	Centroids
Gender	-.27	-.27	Negative Change	-1.37
Hours studying per week	.52	.33	Positive Change	1.18
Computer experience	-.10	-.23		
Learning objective	.01	-.12		
Preferred teaching method	.51	.27		
Type of course	-.19	-.25		
Final grade of the class	-.30	.05		
GPA	.38	.16		
Attitude toward Hort.	1.11	.30		
Evaluation on CIVModules	.18	.10		
Horticulture classes taken	-.33	-.06		
Major	-.53	-.29		
Class standing	-.17	-.13		

Eigenvalue	Rc	Wilks' Lambda	p
1.703	.794	.370	.004

b = Standardized discriminant function coefficient
s = Pooled within-groups structure coefficient
Rc = Cannonical correlation coefficient

From an examination of the standardized discriminant function coefficients (Table 3), it can be concluded that the most highly discriminating variable associated with positive change group was their attitude toward horticulture. The structure coefficients revealed that the discriminating variables with the strongest relationship to the positive or negative change groups were "hours studying per week," "attitude toward horticulture," and "major."

The classification of cases was reported in Table 4. Of the 39 cases analyzed, 92.3% were predicted correctly by the discriminant function in their respective membership groups. The value of Tau was calculated to be .846. The classification based on the discriminating variables resulted

in 84.6% fewer errors than would be expected by random classification.

Table 4

Classification of Cases (n=39)

Actual Group	No. of Cases	Predicted Group	
		Negative Change	Positive Change
Negative Change	18	17	1
		94.4 %	5.6 %
Positive Change	21	2	19
		9.5 %	90.5 %

Percent of cases correctly classified: 92.3%

Conclusions and Implications/Recommendations

Based on the results of this exploratory study, it was concluded that: (1) undergraduate students who had positive changes in their attitudes toward computerized interactive videodisc instruction could be distinguished from those who had negative changes by a set of discriminating variables; (2) the most powerful discriminating variables was "attitude toward horticulture"; (3) students with a positive attitude change tended to spend more time studying per week and had more positive attitudes toward horticulture, while those students with a negative change tended to be majors in landscape architecture; (4) the discriminant function explained approximately 63% of the variance in the discriminant scores; and (5) the discriminant function correctly classified 92.3 % of the cases (n=39).

Based on the results in the study, the following implications and recommendations were made that: (1) gender should not be considered as a factor that helps distinguish students' positive or negative attitude toward IVD; (2) the variables, "hours studying per week," "attitude toward the subject matter," and "major" should be taken into consideration in designing and implementing IVD programs; and (3) this study should be replicated to determine if the factors associated with positive and negative attitudes toward interactive videodisc programs are consistent in another group of students.

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VARIABLES INFLUENCING UNDERGRADUATE STUDENTS' POSITIVE AND NEGATIVE ATTITUDES TOWARD COMPUTERIZED INTERACTIVE VIDEODISC IN INSTRUCTION IN HORTICULTURE

A Critique
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It is most impressive to review the documentation which exits in what the reactor assumes as a relatively new field of technology.

The objectives were well stated, with methodology and findings consistent with the objectives.

The development and validity of the research instruments were well documented and tested for reliability. The sample number for such a study could be debated; however, the situation to be studied doesn't always necessarily lend itself to the topic to be investigated and the research environment. In other words, one either goes with what is available and attempts to draw some tentative conclusions anticipating that future research designs can be generated once some insight is gained into the topic at hand.

The study yields interesting information useful for future studies which focus on new and emerging technology. One particularly interesting observation is the revelation that the most discriminating negative change was observed in students majoring in landscape architecture.

The researchers are to be commended for accepting the challenge of undertaking a study of this type and essentially breaking ground where all will be treading in the future. Significant insights into the use of technology, regardless of the sample size, is valuable information as society attempts to determine the best approach in utilizing technology that is not just in the future, but here and now. Investigators resisted the temptation to analyze the "no change" group.

The researchers are encouraged to repeat the study if the course continues to be offered as it exists. The number of participants would increase. There may be some options to add other discriminating variables and alternative approaches to utilizing technology resuslting in additional information on new and emerging instructional techniques.

AGRICULTURAL EDUCATION BELOW THE HIGH SCHOOL LEVEL 1785-1920

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While the United States is generally recognized as one of the most advanced agricultural countries in the world, many of the initial efforts to feed and cloth early settlers in what was then referred to as the "new world" were less than successful. Attempts by these early American colonists to produce food and fiber were very basic "trial and error" efforts rather than efforts founded on experience or previous knowledge (Cochrane, 1979). Thus, the colonists struggled to obtain adequate supplies of food. Their struggles became even more serious when many food production efforts were completely unsuccessful.

True (reported in Hill, et. al., 1900) wrote an article for the 1899 Yearbook of the United States Department of Agriculture in which he summarized the early development of agriculture in this country. He reported that even though farming practices employed on specifics plots often lead to less than needed success, early settlers found land to be plentiful. Therefore, as production in a field declined, early farmers abandoned the field, cleared new land and established a new field. Thus there was little need for improvement in agricultural practices. In addition, wars with Native Americans and subsequently with various European countries occupied much of the attention of these early settlers.

Also adding to this struggling situation was the lack of agricultural background among the colonists. These first settlers were not farmers. Instead, they were gentlemen adventurers seeking their fortunes, religious dissenters, prisoners taken from jails, poor children, seamen and soldiers. Thus, colonial agriculture and later the teaching of agriculture developed out of information bases that resulted from failures and a lack of understanding on the part of people who did not intend to become farmers. (Cochrane, 1979) The earliest occurrences of agricultural education in the American colonies involved fathers sharing ideas and practices with their children as one generation prepared the next generation for the challenges and opportunities of food and fiber production.

Only after long struggles and encouragement from agricultural societies which began to develop in the later part of the eighteenth century, would this young country begin to develop schools to meet the educational needs of all children. As these schools developed, teachers the work of agricultural societies to help teach food production. They also utilized plants and animals to help enhance teaching and learning of such subjects as math and reading.

Purpose and Objectives

As the authors began their investigation of the beginnings of agricultural education they quickly found that related issues were addressed in remote sections of difficult to locate references. However, with the belief that an understanding of the past is important to the success of the future, the authors initiated this investigation which was designed to accomplish the following objectives:

1. To identify efforts of agricultural societies to provide instruction about agriculture to young people below the high school level from 1785 to 1920.

2. To identify efforts of schools to provide instruction about agriculture to young people below the high school level from 1785 to 1920.

3. To draw implications from history for current agricultural education practices.

Procedures

The investigators followed standard historical research procedures during the conduct of the project. The researchers contacted each state's department of education and agricultural education teacher education units located on land grant university campus requesting information about early efforts to provide agricultural instruction below the high school level within their state. The resources available for this project permitted the investigators to contact one state department of education official and one teacher education program in each state.

At the same time, a comprehensive review of The Agricultural Education Magazine was conducted to provide a foundation for reviewing additional literature sources. The researchers also conducted a comprehensive review of United States Department of Agriculture annual reports or yearbooks. Subsequently, the investigators conducted a computerized library search using the key terms identified in the objectives or research statements, i.e., agriculture instruction and elementary schools. The investigators also conducted additional computerized literature searches using related terms, such as rural schools, nature study, school gardens, agriculture clubs and home projects.

The researchers reviewed the writings of identified authors and compared sources identified in bibliographical entries with the sources identified by the investigators. Thus, the researchers were able to conclude that available resources related to the investigation had been identified.

Results

Early approaches to agricultural education based on chance experimentation helped to develop a belief in "predestination in farm operations in America..." (Carrier, 1923, p. 229). This belief tended to slow progress and cause farmers to view new ideas with skepticism. It also seemed to have caused believers to question the need for education or conversations about agricultural practices. These challenges encountered by early American agriculture have been described as being so extensive that they required the participation of children and adults, men and women, all races and the widest possible representation of cultural and educational backgrounds.

Early efforts of Agricultural Societies

During the later part of the eighteenth century some of the first formal efforts were made to advance agricultural education from father and son talks or conversations among neighbors to more formal settings that would involve relatively large numbers of people. True, (United States Department of Agriculture, 1895) reported that the first society for promoting agriculture in the United States was established in Philadelphia on March 1, 1785, "by men who were for the most part engaged in pursuits having no immediate connection with agriculture." (p. 82) Even though many of the Society's founding fathers were not directly involved in farming, they tended to be influential people who understood the importance of agriculture. True, reported that George Washington and Benjamin Franklin were elected honorary members of this Society. His report stated that Washington and Franklin actively supported the work of the society and general progress in agriculture.

Other similar societies followed in South Carolina, New York, Maine, Maryland, Virginia, Massachusetts and Connecticut. According to True, the New York society published compilations of its work as early as 1792 and the Connecticut society published a similar document in 1802. The publication of these reports provided a base for more scientific approaches to agricultural development and education.

True (1895) reported on action taken by the Philadelphia society to focus attention on the need for agricultural education. On January 21, 1794, a committee was appointed by the Philadelphia Society "to prepare outlines of a plan for establishing a State society for the promotion of agriculture, connecting with it the education of youth in the knowledge of that most important art, while they are acquiring other useful knowledge suitable for the agricultural citizens of the State." Part of the society's plan was to make the "common-school system" in the State

contribute to the technical education of the farmer. The society stated a strong commitment to provide education about agriculture for children in schools as they forwarded a document to the state legislature. Through this document the Society stated vigorous support for agricultural education in the public schools. True reported that this effort seems to have been the first attempt in the United States to focus the attention of a lawmaking body on the importance of agricultural education. The following quotation from document developed by the Philadelphia Society demonstrates the group's commitment to agricultural education.

> The country school masters may be secretaries of the county societies, and the schoolhouses the places of meeting and the repositories of their transactions, models, etc. The legislature may enjoin on these schoolmasters the combination of the subject of agriculture with the other parts of education. This may be easily effected by introducing, as school books, those on this subject, and thereby making it familiar to their pupils. These will be gaining a knowledge of the business they are destined to follow, while they are taught the elementary parts of their education. Books thus profitable to them in the common affairs of life may be substituted for some of those now used, and they can easily be obtained. Selections from the best writers in husbandry may be made by the society. The essays of our own experimentalists or theorists and the proceedings of the society will also afford information. (True, 1895,p. 83)

True (1895) reported additional activities of various agricultural societies and efforts to enhance knowledge of farming. One of the more aggressive programs in his report involved the New York State Agricultural Society. During their annual meeting in January, 1844, the Society appointed a committee to promote "the introduction of agricultural books and studies in the schools and libraries throughout the State, and also for the purpose of selecting such prize essays from among the transactions of the society as may be most appropriately published in volumes of suitable sizes for the family and school district libraries..." (p.88).

According to True's report, the committee had a strong commitment to its work as they subsequently entered into correspondence with school superintendents and other influential citizens in several States. After completing this series of meetings and following the State Convention of Common-School Superintendents held in June, 1844, the committee issued a statement that in their opinion "the time has arrived when the elements and scientific principles of agriculture should be taught in all our schools, ..." (p. 88)

Some societies grew substantially and developed local

branches in various states. Among such organizations were the Patrons of Husbandry (Grange) and the National Farmers' Alliance. According to Dabney (1890, as reported by Stimson and Lathrop, 1942) these organizations "exerted great influence especially in education of farmers and their families"... (p. 3)

Five years after his previous discussion of efforts to integrate agricultural instruction into schools and the role of agricultural societies in this movement, True (reported in Hill, 1900) provided the following detailed description of progress in agricultural education and what he referred to as nature studies. It is important to remember that the "common schools" discussed by True provided education below the level of what would be considered high school.

> Throughout the century efforts have been made from time to time to introduce instruction in agriculture into the common schools. These efforts have uniformly failed, partly because too much was attempted, and partly because the condition of the schools did not permit changes in their curriculum in this direction. Thus far our common schools, especially in the rural districts, have done very little toward introducing even elementary lessons on natural objects, and much less than systematic study of the elements of any natural science. The organization of anything like a complete system of common schools over vast areas of a new territory with a rapidly growing population has been a gigantic task, and until recently there has been little opportunity for the consideration of measures for the improvement of courses of instruction in our rural schools. We have been justly proud of the wide and free dissemination of elementary education in this country, but we have hardly yet come to realize how much needs to be done to put these schools on the most efficient basis. For some years it has been apparent to close students of the rural schools that the most practicable step toward the introduction of instruction which would directly bear on agriculture was to secure some definite training of the pupil's powers of observation through exercises based on natural objects. A very hopeful beginning of a movement in this direction, which now promises to become widespread, was made in 1894 in connection with the College of Agriculture of Cornell University .... (177-178)

True continued his discussion by describing the work conducted by Cornell University in an effort to enhance the preparation of teachers to provide agricultural instruction.

> By visiting the rural schools and giving sample lessons, the officers in charge of this work ascertained the needs and requirements of these schools as regards nature study and secured the interest and cooperation of a considerable number of school officers and teachers in

a comparatively short time. To show the teachers more definitely how nature study may be presented to their pupils, a series of leaflets was begun, which were distributed throughout the State wherever teachers showed an interest in the movement. The plan proved at once successful, and means for its extension have been increased by succeeding legislatures. A corps of instructors have been employed in canvassing the State, and these have been aided by special teachers from time to time as occasion requires. These instructors meet the teachers of the schools in the presence of their pupils and at teachers' meetings for the purpose of illustrating methods for teaching nature studies. The leaflets serve as texts for the subjects taught. Very naturally, many of these leaflets are on subjects directly relating to agriculture, such as cultivated plants, fruits, weeds, and insects. It has been impracticable, even if it were at all desirable, to confine this movement to the rural schools, for the city teachers, who had in many cases begun nature teaching in one form or another, have been very eager to receive and utilize the leaflets and other special instruction on nature teaching emanating from Cornell University. It is reported that 25,000 teachers in New York State alone have received some instruction in this way, and the leaflets, being sold, are widely disseminated in other states. Some of the other colleges of agriculture, notably in Indiana, Missouri, Rhode Island, and Pennsylvania, are taking up this work, and plans for the introduction or more effective use of nature study in the common schools are being made in a number of States. (pp. 177-178)

As True indicated, efforts to advance agricultural instruction during the middle of the nineteenth century had expanded to include a variety of groups which then included colleges of agriculture.

Early Efforts of Schools

During the first two centuries of our history, immigrants who came to this country brought increasingly diverse backgrounds and educational experiences. Included in this more diverse population were those with some experience in agriculture. Stevens and Howell (Howell, Lindley, Morton, Stevens and Yoder, 1983) provided additional insight into conditions that occurred during the early part of the nineteenth century as they wrote:

Early settlers in North America brought with them the practices in crop production and animal husbandry generally used in Europe. They imported seeds, plants, breeding stock and hand tools. The struggle for survival at a subsistence level of farming was the primary way of life in the United States when the nation

> was formed... Knowledge, however, continued to be passed from fathers to sons verbally, and was meager in quantity. Books and magazines were few, many adults were illiterate, and schools enrolled children for only a few years. (p.11)

As one of the most prolific writers on the early years of agricultural education, True was also concerned about the general development of schools. His writing reflects both a concern for inadequate progress and an understanding of the factors which contributed to this lack of needed progress. In the following detailed description of progress in agricultural education and what True referred to as nature studies, it is important to remember that the "common schools" discussed by True provided education below the level of what would be considered high school.

> Throughout the century efforts have been made from time to time to introduce instruction in agriculture into the common schools. . . Thus far our common schools, especially in the rural districts, have done very little toward introducing even elementary lessons on natural objects, and much less than systematic study of the elements of any natural science. . . We have been justly proud of the wide and free dissemination of elementary education in this country, but we have hardly yet come to realize how much needs to be done to put these schools on the most efficient basis. For some years it has been apparent to close students of the rural schools that the most practicable step toward the introduction of instruction which would directly bear on agriculture was to secure some definite training of the pupil's powers of observation through exercises based on natural objects.

Foght (1911) believed that a solution for many of the difficulties present in schools at that time could be obtained through the observation and study of nature. He believed that close observation of the natural world would encourage children to ask questions, to sharpen their observation skills and in general cause students to think. Foght indicated, "This is not so much an attempt to add another subject to an already overcrowded curriculum. It is rather a new direction given to old subjects - a leaven infused into old forms - than anything else. It applies in great measure to the entire course of study, since it is possible to encourage the child to close and careful observation of nature through a properly directed lesson in English composition as readily as through lessons in geography and elementary science." (p. 155-156)

However, Foght, True and other leaders of the time understood that the lack of appropriately focused materials as well as an inadequate supply of such materials severely hampered the development of the concept of broad-based

education intended for all children. Thus, many educators and states took an active interest in the use of agriculture and nature to enhance and make practical instruction in reading, writing and mathematics. Fogth (1911) reported that the National Grange passed a resolution in 1878 favoring the teaching of agriculture in elementary and junior high schools. However, the public school systems of the time were not in a position to provide this type of education.

The following figure is included to provide an overview of efforts in various states to provide instruction in food production for students below the high school level. The information included in Figure 1 is based on the work of Stimson and Lathrop (1942) and Foght (1911).

Figure 1
State efforts to provide instruction in food production

State	Date	Effort
Alabama	1880	Booker T. Washington's began teaching agriculture in a one room school at Tuskegee. Supporters of the school purchase a 100 acre farm to help provide a setting for students to obtain practical experience and pay part of their schooling expenses.
Arkansas	1909	Act of 1909 mandated the teaching of agriculture and horticulture in elementary schools of the state.
Colorado	1917	Gardening taught in certain schools before 1917
Florida	1909	Act of 1909 required the teaching of agriculture in all elementary schools in the state.
Georgia	1903	Teaching of agriculture in elementary schools mandated.
Hawaii	1900	Prior to 1900 the Minister of Agriculture strongly encouraged agricultural instruction in elementary schools for boys. First teacher of agriculture appointed 1900.
Illinois	1900	Prior to 1900, State course of study included the study of agriculture in elementary schools.
Indiana	1913	Instruction for seventh and eighth grade students developed following Act of 1913.
Iowa	1846	State Constitution required legislature to encourage agricultural improvements. Governor Briggs (1850) directed legislature to determine

		if agricultural instruction could be initiated in common schools. In 1910 an act was passed requiring the teaching of agriculture in elementary schools.
Kansas	1900-1910	Agriculture was made part of the "Course of Study for Common Schools".
Kentucky	1918	Act required agricultural instruction in rural elementary schools for fifth and sixth grade students.
Massachusetts	1858	Agricultural instruction on a voluntary basis began to be reported as early as 1858. A law enacted in 1862 permitted schools to provide such instruction. A State Department of Education report on a study entitled "Agriculture a Phase of Liberal Education in Elementary Schools of Massachusetts" built a strong case for agriculture instruction in elementary schools.
Michigan	1901	Act provided basis for agricultural instruction in elementary schools. By 1906, agriculture was being taught in about 300 school districts.
Minnesota	1901	State legislature appropriated funds for the development, printing and distribution agricultural instructional materials for rural elementary schools.
Missouri	1886	Arbor Day began a movement toward agricultural instruction in public schools. By 1899 Elementary teachers were required to teach agriculture.
Montana	1899	Agricultural instruction in grade schools was introduced by State Superintendent of Schools.
Nebraska	1900	General agriculture was regularly taught in upper grades of elementary schools.
New Hampshire	1910-1920	Agricultural instruction provided for fourth through sixth grade with emphasis on gardening.
New Jersey	1917	Elementary school instruction with students growing and exhibiting products.
New Mexico	1912	Territorial laws before 1912 Statehood, required agricultural courses for seventh and eighth grade students.
New York	1844	A State Convention of County School

		Superintendents was encouraging the teaching of agriculture. By 1878, graduates were carrying forward a new method known as object teaching of agriculture and nature study.
Ohio	1911	Act provided for State level supervision of agricultural instruction and mandated elementary school and high school agricultural instruction in rural and village school districts.
Oklahoma	1907	Act required agricultural instruction by each common school in the State that received public funds. Agricultural instruction was offered as an appreciation or orientation course for seventh and eighth grade students.
Oregon	1918	Prior to 1918, State law required agricultural instruction at the "upper grades" of rural elementary schools.
Pennsylvania	1919	The State Department of Education provides supervision for 25,000 rural boys and girls enrolled in junior projects. In 1922 the State developed and published a syllabus for agriculture for junior high school students.
Puerto Rico	1901	Established agricultural-rural schools that taught agriculture, reading, writing and arithmetic to first, second and third grade students. In 1928-29, consolidated schools provided the opportunity to add agricultural instruction to grades four through eight.
Texas	1903	Instruction about agriculture was introduced into the public schools of Henderson, Texas in 1903. Two years later (1905) agriculture was introduced into the San Antonio elementary schools. In 1907 the State Legislature passed a bill requiring agriculture to be taught in Texas elementary schools with student populations of 300 or less. Larger schools had the option of providing agricultural instruction.
Vermont	1824	An agricultural reader for school use was published in Windson, Vermont. In 1854, a state act authorized the Governor to purchase, at state expense, one copy of Warning's Elements of Agriculture for each town. Each town would then purchase additional copies as needed.
Washington	1909-1910	Elementary school agriculture instruction

		taught in 12 communities during the school year. 1911, the State Board of Education made agriculture a required subject for eighth grade students.
West Virginia		1911 School laws mentioned agriculture as a required subject in schools.
Wisconsin	1911	State bill provide funds for schools to teach agriculture, both high schools and elementary schools.
Wyoming	1915	State course of study for rural elementary schools included both agriculture and nature study.

Several factors influenced agricultural education at the beginning of the twentieth century. World War I removed large numbers of men needed for the war effort and thus farms became even more efficient by producing more with less manpower. In addition, more people were needed in factories to produce manufactured goods. Thus, the number of children impacted by education about agriculture also declined since education about agriculture was becoming a rural effort.

An additional force that impacted agricultural education below the high school level arrived in 1917 with the passage of the Vocational Education Act. This legislation established federal support for vocational agriculture instruction at the secondary school level. Thus, as many school systems reacted to the decline in farm population and this new support for high school agriculture, broad-based instructional programming about agriculture for students in elementary and junior high schools began to decline.

During this same time period, the agricultural education system, high schools, colleges of agriculture and affiliated experiment stations, extension services, and postsecondary agriculture programs, were providing instruction related to technical advancements to help American agriculture become the world leader in the production of food and fiber. The United States was becoming quite effective at producing more and more products with fewer and fewer farmers.

Conclusions and Implications

The results of the investigation have provided the researchers with information from which the following conclusions have been drawn and implications are offered:

1. Early educational programming in this country drew significantly from agriculture and nature in general to provide both the substance of instruction and examples to enhance instruction. Thus, it appears that hands-on instruction with examples provided from nature/agriculture

can enhance current instructional efforts in various disciplines.

2. Early educators were quite concerned about making connections between students' experiences and classroom instruction. Thus, examples from agriculture and nature were important aspects of instructional programs. Agriculture and nature continue to offer significant motivational benefits to educational programs.
3. Early agricultural organizations and educators played major roles in the growth and develop of public education below the high school level. As today's agricultural educators reflect on such roles, they may begin to endorse expanded roles and recognize significant opportunities for leadership in elementary and middle/junior high school programming.

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AGRICULTURAL EDUCATION BELOW THE HIGH SCHOOL LEVEL 1785 - 1920

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The authors make clear what they intend to accomplish in the paper: (1) the focus of the paper is instruction about agriculture below the high school level; (2) the time frame is 1785-1920; (3) the emphasis is on efforts of agricultural societies and schools in encouraging and providing instruction about agriculture; and (4) the intent is to draw implications for current agricultural education practices.

The authors state that they "followed standard historical research procedures" in conducting the study. However, the sentences immediately following do not substantiate that claim. They contacted state departments of education and agricultural education units in land grant universities requesting information about early efforts to provide agricultural instruction below the high school level. I question whether supervisors and faculty in agricultural education are appropriate primary sources of information regarding instruction about agriculture for students below the high school level from 1785 to 1920. Also I doubt that The Agricultural Education Magazine proved to be a valuable primary source since its first year of publication was 1929. Furthermore, I do not think the Magazine is noted for articles on the history of agricultural education, particularly agricultural education below the high school level.

The authors rely heavily on the writings of A. C. True, U. S. Department of Agriculture, as a source of information. True is quoted extensively; a substantial part of the paper is a reiteration of True's accounts and conclusions about early efforts of instruction about agriculture. No source is cited for the three-page listing of efforts in the various states to require or encourage instruction in food production in public schools in the late 1800s and early 1900s. The authors relied principally on secondary not primary sources.

The authors make explicit two important points. First, instruction about agriculture -- particularly for students below the high school level -- preceded instruction in agriculture, which had and continues to have its major focus at the high school level. Second, early efforts to promote instruction about agriculture were based on the proposition that including agriculture in the curriculum can make formal instruction in the schools more meaningful, more practical, and teach students to observe and think. The authors allude to but do not develop sufficiently the proposition that the establishment of the federally-assisted system of vocational agriculture was a major factor contributing to the disappearance of instruction about agriculture both at the high school level and in elementary and junior high schools. The authors mention some important implications for current policy and practice, but fail develop either the substance or import of the implications.

LEADERSHIP ABILITY OF SECONDARY PUBLIC SCHOOL TEACHERS

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Introduction

Education is faced with a number of challenges in the 1990s. Rapid changes in today's society require active, effective leaders to guide communities into the next century. The multifaceted roles played by secondary teachers encompass their leadership role not only in the classroom but also in the community. Traditionally, the public has viewed teachers as the primary institutional or curriculum leaders of students in the classroom (Brownlee, 1979). Brownlee asserts that teachers serve in leadership roles when dealing with administrators, supervisors, parents, and other teachers.

Education plays a vital role in developing leadership abilities of tomorrow's community leaders. Previous studies have determined that development of leadership abilities is an important aspect to the educational advancement of participants. Aldrich, 1988, reported that representatives from agribusiness viewed participants of leadership abilities as valued employees. Interactions between teachers and community members present numerous opportunities for teachers to assume leadership positions. How teachers perceive their own leadership abilities may determine how often and the amount of commitment they accept leadership positions both in the school and community. Teachers often assume leadership roles within the community: interacting with students and parents outside the classroom, serving as consultants for business and industry and working with other members of the community on civic or other projects.

Purpose and Objectives

The purpose of this study was to determine the perceived leadership abilities of public secondary school teachers in a midwestern state. The objectives included:

1. Identify the perceived leadership ability of public secondary school teachers.
2. Compare the results of perceived leadership abilities of public secondary school teachers with selected demographic variables.
3. Identify the perceived leadership needs of public secondary school teachers.
4. Compare the results of this study with results of two previous leadership studies completed by Luft in 1986 and Lester in 1989.

Methods

The population for this study was public secondary school teachers in a midwestern state. A list of teachers who teach at least half time in high school (grades 9-12) was

obtained from the Department of Public Instruction. Of a total population of 3,043, a random sample of 300 was taken; 225 of the 300 teachers sampled returned the survey for an overall response rate of 75.0 percent.

Data were collected through a direct mail questionnaire. The original questionnaire was developed by Luft (1986) in his study of young rural adults, ages 18-40. Lester (1989) used a similar questionnaire in his study of young urban adults 18-40. Some questions from the original questionnaire were used in order to make comparisons between the two studies mentioned and the current study. An analysis of the reliability of the instrument was determined to be r = .94 using KR-20 (Kuder-Richardson-20) and Cronbach coefficient alpha at the .05 level.

The SPSS-x program was used to compare demographic groups (SPSS, Inc., 1982). Demographic data were calculated using frequencies and percentages as well as mean scores, standard deviations and rankings for each of the perceived leadership ability statements. Analysis of variance (ANOVA) was used to compare the demographic groups having only two variables (gender and place where raised) to determine statistical differences. Multivariate analysis of variance (MANOVA) using the Least Significant Difference (LSD) analysis of variance was employed when significant differences existed between the demographic group with two or more variables to determine where differences occurred. The alpha level was set at .05 for all tests.

Findings and Conclusions

Under the category of gender, 104 or 46.2 percent were male and 121 or 53.8 percent were female. Marital status groups were not divided as evenly: 181 or 80.4 percent were married, 29 or 12.9 percent had never been married, and 15 or 6.7 percent were either divorced or widowed. Under the category of the place where raised, 100 or 44.4 percent were raised on a farm or in the country, and 125 or 55.6 percent were raised in a town or city. The teachers' experience varied from 1 to 37 years, with a mean of 15.4 years and a standard deviation of 8.3 years. Responding teachers represented a wide variety of academic areas.

Public secondary school teachers in a midwestern state perceived their leadership ability to be quite high. Mean scores for all 40 perceptions were 4.0 and over (using a six-point scale), with 22 of 40 perceptions at 5.0 and over.

The analysis of variance indicated that 4 of the 40 perceptions of leadership ability were statistically significant between females and males with females having a higher mean perception on all four statements. The statistically significant statements were: "I willingly listen to others" (female (F)=5.5, male (M)=5.2); "I can see both sides of an argument in question" (F=5.1, M=4.9); "I like to see conflicts resolved" (F=5.7, M=5.4); and "Belonging to organizations is important to me" (F=4.1,

M=4.0). Females exhibited greater leadership ability mean scores on 24 of the 40 perceptions and equal leadership ability mean scores on 11 of the 40 perceptions. This was similar to the findings of Luft (1986) and Lester (1989).

The multivariate analysis of variance indicated a statistical difference between married respondents and respondents who have never been married on 2 of the 40 perceptions. Respondents who were never married had a greater leadership ability mean score for 26 of the 40 perceptions when compared to respondents who were married and for 23 of the 40 perceptions when compared to respondents who were divorced/widowed. Respondents who were never married had equal leadership ability mean scores for 8 of the 40 perceptions when compared to married respondents and 9 of the 40 perceptions when compared to respondents who are divorced/widowed. Again this was similar to the findings of Luft (1986) and Lester (1989). There were no statistical differences between respondents who were divorced/widowed and those who were married, nor were there statistical differences between respondents who were divorced/widowed and those who have never married. The following leadership statements were statistically different: "I am original in my ideas and activities" (Married (MA)=4.7, Never married (NM)=5.1) and "Belonging to organizations is important to me" (MA=3.9, NM=4.5).

The analysis of variance indicated a statistical significance between those raised on a farm or in the country and those raised in a town or farm on 2 of the 40 perceptions. The following perceived leadership statements were statistically different: "I feel at ease leading a group" (Raised on a farm or in the country (FA)=4.6, Raised in town or in a city (TO)=4.8); and "I am willing to take charge and lead a group" (FA=4.6, TO=4.9).

The need to develop leadership programs was identified using frequencies which indicated the perceived leadership needs of public secondary school teachers. The question "Is there a need for leadership development programs for teachers?" had the following results: 188 (83.6%) said yes, 29 (12.9%) said no, and 8 (3.6%) were undecided--did not check yes or no but wrote in maybe. The question "If leadership development programs were available to you, would you participate?" had the following results: 87 (38.7) said yes, 17 (7.6%) said no, and 121 (53.8%) said maybe.

Some differences were found when comparing the current study (public secondary school teachers) with the studies done by Luft (1986) and Lester (1989). Teachers' mean scores that represented a 0.5 or greater statistical difference when compared to the other two studies are as follows: "Other people accept me as a leader", "I encourage others to become involved in various projects", "I get involved in professional and community affairs", "I feel at ease in leading a group", "I am willing to take charge and lead a group", and "I view myself as a professional." These statements describe skills related to the teaching

profession. The differences found during comparisons with young rural adults and young urban adults may have been the result of homogenous grouping.

Summary

Public secondary school teachers in this study perceived their leadership abilities to be high. Teachers may then be a good group within the community to serve as role models for young people within society. Perhaps these young people will imitate some of the positive leadership abilities of their teachers. Students who acquire good leadership abilities, then, may be better prepared to serve as competent leaders in their communities' futures. Challenges and problems that exist in society will not be solved overnight; if good leaders continue to serve the public interest, however, many challenges may be met and many problems solved.

Recomendations

Based on the findings and conclusions of this study, the following recommendations are made.

1. Leadership development programs should be formulated and implemented to improve teacher leadership abilities.
2. Additional studies should be conducted to determine:
   a) why teachers' leadership perceptions were lowest in the areas of community involvement and belonging to organizations,
   b) why females have a higher perceived leadership level than males,
   c) why differences in perceptions related to respondents marital status varies.

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LEADERSHIP ABILITY OF SECONDARY PUBLIC SCHOOL TEACHERS

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The authors list four objectives for the study: (1) describe public secondary school teachers' perceptions of their leadership ability; (2) investigate relationships between perceptions of leadership ability and three demographic variables, namely gender, marital status, and where raised; (3) describe teachers' perceptions of their leadership needs; and (4) compare their results with the findings of two similar studies where the respondents were rural young adults and urban young adults.

The substance(content) of the study -- leadership -- is an important and complicated concept. The authors neither allude to nor report the vast literature and research on leadership, such as descriptions of leadership behavior, how perceptions about or demonstrations of leadership are measured, or theories about leadership development and behavior. The authors do not indicate how they define leadership. Their operational definition is the 40 statements to which teachers responded. The only hint the reader gets about how the authors define leadership is the 8 statements from the perception scale that are quoted in the paper when differences among subgroups of respondents are discussed. The authors fail to indicate the response scale used. We know it is a six-point scale; are readers to assume that the scale is a Likert-type scale ranging from strongly agree to strongly disagree?

The authors are aware of the concern for reliability of the 40-statement instrument. They report an internal consistency coefficient of .94, mentioning both Kuder-Richardson 20 and Cronbach's alpha. An internal consistency coefficient of the type mentioned is calculated from summing the responses to all 40 items and using the sum as the "perceptions of leadership ability" score. All the analyses reported in the paper are for responses to individual statements, not to summed scores for the 40 statements. Consequently, the reliability coefficient given is not relevant to the analysis presented.

The analysis strategy was a series of analysis of variance tests for each of the 40 statements for each of the three demographic variables. The evidence overwhelmingly indicates no significant differences -- for gender, no significant differences for 36 of 40 statements; for marital status, no significant differences for 38 of 40 statements; for place where raised, no significant differences for 38 of 40 statements. As noted above, analysis of individual statements is conceptionally questionable. Additionally, multiple analysis of variance tests (in this case 40 for each of the three demographic variables) clearly raise the risks of inflated alpha; therefore, the probability is high that the few statistically significant differences could be chance happenings. In light of the analyses reported, the most defensible conclusion is that there are no relationships between teachers' perceptions of their leadership ability and the three demographic variables. No rationale is presented for comparing the findings of the study with similar studies of rural young adults and urban young adults.

CENTRAL REGION READERSHIP SURVEY OF THE FFA NEW HORIZONS MAGAZINE

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Introduction

In the past several years, numerous changes have occurred within agricultural education and the FFA. The agricultural education profession has moved from a predominantly production orientation to a more comprehensive agriscience focus; the Future Farmers of America is now named the National FFA Organization; the national headquarters has a new organizational structure and the National Future Farmer has become FFA New Horizons. These changes and others reflect and underscore the importance of understanding the various publics served by agricultural education and the FFA.

This is particularly true of the FFA New Horizons magazine, perhaps the most important public relations vehicle used by the National FFA Organization. In order to ensure the long-term efficacy of FFA New Horizons, its writers and editors must continually monitor readers' perceptions, attitudes and uses of the magazine.

The effectiveness of a publication greatly depends on how it reflects the interests of its readers. Unfortunately, the editor of a magazine has no easy way to obtain detailed and comprehensive feedback from the magazine's readers. A number of studies have shown that editors sometimes lack a clear perception of what their readers want (Wink, 1979). Letters to the editor are a common but unsystematic method of determining reader interest. They do not represent those readers who have strong opinions but do not care to write. Moreover, they tend to reflect attitudes and opinions about issues rather than perceptions about magazine form and content, per se. Attempts to gather readership data with survey research are rare (Wink, 1979).

According to Redding (1982), audience surveys can help maintain or open feedback channels so that a publication can remain responsive to its readers. Surveys enable editors and communications' managers to gather information about their audiences so they can more closely correlate editorial content to reader needs, expectations and interests (Dreyer, 1984; Tucker and Cooper, 1987; Suvedi, et.al, 1991).

A survey is a valuable tool in analyzing reader opinion. A well designed readership survey, based on sound research principles, can yield more reliable information than occasional letters and reader comments. Based on this information, editors can make their publications more effective.

Purpose and Objectives

This study was conducted to determine the appropriateness of FFA New Horizons to its readership in the FFA's central region. The specific objectives of the study were:

1. Determine demographic information of FFA New Horizons central region readers.

2. Identify the reading habits (kind and quantity of similar documents received) of FFA New Horizons clientele in the central region.

3. Ascertain central region readers' utilization of the FFA New Horizons magazine.

4. Determine central region readers' preferences for career development information in the FFA New Horizons magazine.

5. Determine FFA New Horizons value to its readers in the central region.

Procedures

The research design used for this study was a descriptive survey design. A focus group was used to assist in the development of the research instrument and to provide qualitative data for the study. The focus group was designed to tap the experiences, skills or feelings of participants. A field test conducted in October of 1991 with Michigan FFA members assured the usability and validity of the technique. A month later, a central region focus group convened during the 1991 National FFA Convention. The nominal group consisted of selected FFA members who were nominated by state supervisors for agricultural education. The results of the focus group, coupled with the researchers' previous work in this area, provided the most relevant questions for the survey.

Survey validity was established using a panel of experts that consisted of the FFA New Horizons' staff, the 1991-92 Michigan State FFA Officers, and faculty from the Department of Agricultural and Extension Education at Michigan State University. Reliability was established by a pilot test with a like group of students and advisors not in the sample. Reliability coefficients ranged from .65 to .94.

Systematic random sampling was used to select 216 central region FFA members and 107 central region FFA advisors, from the FFA New Horizons' mailing list. The Total Design Method (TDM) (Dillman, 1978) was utilized. A mail questionnaire was used to collect data. The questionnaires were mailed to the sample population on February 14, 1992. A follow-up postcard was mailed one week later, followed by a second mailing of the questionnaire on March 2, 1992. A third follow-up mailing was sent to the non-respondents on March 18, 1992.

Analysis of Data

Data were analyzed using the Statistical Package for the Social Science (SPSS/PC+). The .05 level of significance was selected for use in interpreting the findings of the study. Frequencies, means, standard deviations, analysis of variance (ANOVA), and T-tests were used to analyze data.

Early and late respondents were compared to ensure generalizability to the population. Research has shown that late respondents are similar to non-respondents (Miller, 1983). Because there was no difference between early and late respondents, the results to this survey can be generalized to the population.

Results

A total of 142 FFA members and 90 FFA advisors returned completed questionnaires for a combined response rate of 72%. Because of missing data, totals do not always equal the number of respondents. Over 73% of FFA members and over 92% of FFA advisors were male. Figure 1 shows the

gender of central region FFA members and advisors who responded to the survey. The average age of respondents was 16.5 years for FFA members and 38 years for FFA advisors.

The survey found that 78% of the FFA members and 81% of the FFA advisors read at least 50% of the magazine. Only 3.5% of the FFA members and 1.3% of the advisors did not read FFA New Horizons. Figure 2 illustrates what percentage of FFA New Horizons members and advisors read.

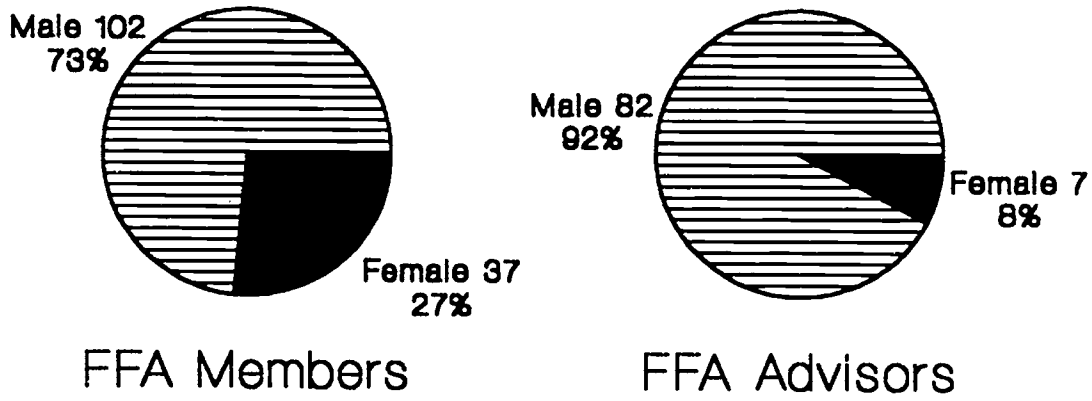

Figure 1. Gender of central region FFA members and advisors.

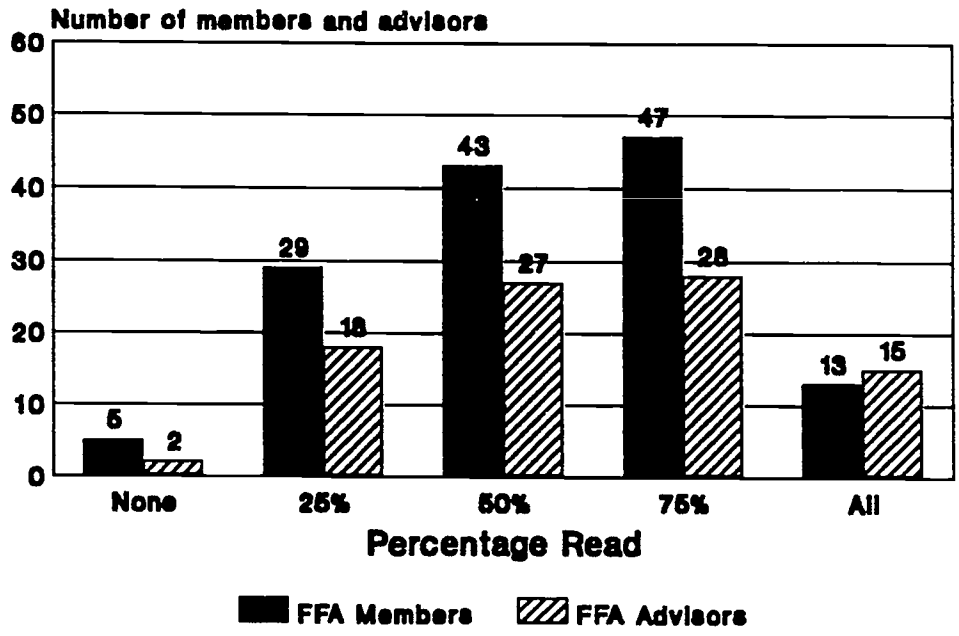

Figure 2. Percentage of FFA New Horizons read by central region FFA members and advisors.

Both FFA members and advisors responded that topics of personal interest were quite important in determining which articles they read. FFA advisors also thought that photographs and state or regional topics were quite important in determining reading interest. FFA advisors thought that article title and photographs were quite important. Table 1 shows the means and rank (based on a 5 point scale) for both FFA members and advisors.

Table 1

Importance of magazine items when determining which articles to read

Item	Not Important	Somewhat Important	Important	Quite Important	Extremely Important
Personal Interests				3.92 (M) 3.97 (A)	
Article Title			3.45 (M)	3.72 (A)	
Photos				3.60 (M) 3.62 (A)	
State Topics			3.20 (M)	3.55 (A)	
Regional Topics			2.93 (A)	3.52 (M)	
Photo Captions			3.40 (M) 3.40 (A)		
Article Length			2.68 (M) 2.64 (A)		

Member=(M) Advisor=(A)

When asked how often they read various sections, FFA members and advisors indicated they frequently read the "FFA in Action," cover story, features, FFA/careers section, "Chapter Scoop," and the joke page. FFA advisors also stated they frequently read "News in Brief," "Looking Ahead," and "Front Line." Respondents occasionally read "Mail Bag," "My Turn," and advertisements.

When considering the layout of the magazine, FFA members and advisors felt the photographs, headlines, story length, graphics, letter size, page arrangement, advertisements, paper quality, and writing quality were all good. Respondents agreed that writing quality, paper quality, and photographs deserved the highest rating among layout components.

FFA Members were asked what other magazines they regularly read. Central region FFA members listed general automobile magazines as the magazine they most often read. General agricultural and hunting magazines, and Sports Illustrated followed respectively. Magazines were placed into 10 categories for reporting purposes. Table 2 shows the number of responses in each category.

Table 2

Magazines read by central region FFA members

Category	Frequency
Wildlife/Natural Resources	73
Agricultural/Country	71
Youth	70
Sports	36
News	14
Entertainment	12
Women	7
Science	4
Family	1
Other	37

FFA members and advisors were asked to rate the usefulness of the FFA New Horizons for selected uses. Areas listed were different for FFA members and advisors. FFA members indicated that the FFA New Horizons was quite useful for career exploration, new chapter activities, trends in agriculture, and current FFA issues. Career information received the highest ranking. Table 3 shows the FFA members' mean scores (based on a 5 point scale) for each use.

Table 3

FFA members' rankings of usefulness of FFA New Horizons

ITEM	NOT USEFUL	SOMEWHAT USEFUL	USEFUL	QUITE USEFUL	EXTREMELY USEFUL
Career Exploration				3.76	
New Chapter Activities				3.63	
Trends in Agriculture				3.62	
Current FFA Issues				3.57	
Leadership Development			3.42		
Agricultural Classroom Activities			3.41		
Motivation			3.36		
SAE Project Development			3.30		
Pleasure Reading			3.27		
Presentations			3.17		

FFA advisors ranked current FFA issues as the most useful information in the FFA New Horizons magazine. Other items listed as quite useful included sources of new FFA ideas, reading for pleasure, leadership development, and motivational tool. Advisors rated the magazine only somewhat useful for assigned reading and class presentations. Table 4 shows the mean scores (based on a 5 point scale) for FFA advisors.

Table 4

FFA advisors' rankings of usefulness of FFA New Horizons

ITEM	NOT USEFUL	SOMEWHAT USEFUL	USEFUL	QUITE USEFUL	EXTREMELY USEFUL
Current FFA Issues				4.06	
Sources of New FFA Ideas				3.78	
Reading for Pleasure				3.67	
Leadership Development				3.65	
Motivational Tool				3.61	
Career Exploration			3.49		
SAE Projects			3.40		
Trends in Agriculture			3.37		
Interest Approaches			3.13		
Article Reviews			2.75		
Class Presentations		2.34			
Assigned Reading		2.13			

FFA members and advisors both stated they would like more career information articles included in the magazine. Respondents are pleased with the amount of information on colleges/universities, urban articles, rural articles, national officer articles, and regional FFA information that is currently in the magazine. FFA advisors were unsure whether more FFA Alumni articles should be in the magazine. Table 5 shows the mean scores (based on a 5 point scale) for both central region FFA members and advisors.

Table 5

Information that should be included in FFA New Horizons

Categories	None	Less	Unsure	Same	More
Career Information					4.54 (M) 4.55 (A)
College/University Information				4.30 (M) 3.86 (A)	
Regional FFA Information				4.21 (M) 3.67 (A)	
FFA Success Stories				4.18 (M) 4.44 (A)	
Rural Articles				4.15 (M) 4.07 (A)	
National Officer Articles				3.82 (M) 3.51 (A)	
Urban Articles				3.60 (M) 3.75 (A)	
FFA Alumni Information			3.16 (A)	3.60 (M)	

Member=(M) Advisor=(A)

The FFA members and advisors were asked to compare the FFA New Horizons magazine to other magazines they read. Respondents rated the magazine on a zero to 10 scale, with 10 being the high. Both FFA members and advisors rated the FFA New Horizons a seven when compared to other magazines they regularly read. Table 6 shows the ratings of the FFA New Horizons.

Table 6

Ratings of FFA New Horizons by central region FFA members and advisors

Group	N	Mean	Standard Deviation	Minimum Rating	Maximum Rating
FFA Members	135	6.65	1.87	1	10
FFA Advisors	84	7.05	1.54	3	10

Many FFA members and advisors would like to see the number of issues of the FFA New Horizons magazine increased. Over 56% of the FFA members and 45% of the FFA advisors indicated they would like more issues of the FFA New Horizons magazine than they are currently receiving. Table 7 shows the percentage of FFA members and advisors and the number of issues that they would like to receive.

Currently, $1.75 of FFA members' dues are designated to support the FFA New Horizons magazine. When asked how much additional dues they would pay to support the magazine, over 91% of FFA members indicated they would pay at least $1.00 more dues. Over 63% of FFA advisors thought members would pay at least $1.00 more dues to support the magazine. Figure 3 shows the frequencies and percentages of central region FFA members and advisors in each category.

Table 7

Number of issues of the FFA New Horizons magazine preferred

Number of Issues Preferred	FFA Members		FFA Advisors	
	N	%	N	%
Fewer than 6	4	2.8	0	0.0
Six (same)	52	36.6	48	54.5
Nine	32	22.5	20	22.7
Twelve	48	33.8	20	22.8
TOTALS	136	100.0	88	100.0

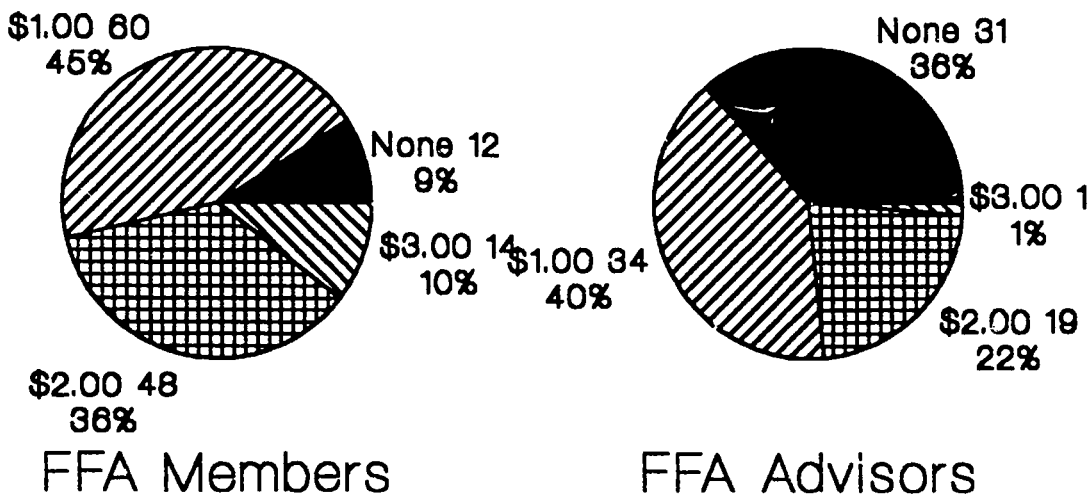

Figure 3. Additional dues central region FFA members and advisors would pay for FFA New Horizons.

Central region FFA members and advisors where also asked to provide written comments about the FFA New Horizons magazine. A sample of the comments is below.

FFA Members

"I like the magazine. It gives me information I need to expand my knowledge of the FFA organization."

"I would like to see more information about colleges. I would also like to get the magazine more often."

"I think the FFA New Horizons is a great magazine."

"I would like to hear a lot more about the happenings of each state..."

"I feel the FFA New Horizons Magazine is a insightful and interesting magazine, but I feel it should broaden its horizons as far as going out and finding new and different people to interview..."

FFA Advisors

"This is an excellent support element of the FFA & I hope it continues that way."

"High Quality Publication - I read it as a member - and enjoyed it. I enjoy reading it today as an instructor. I encourage students in class to discuss the topics in each issue. Please continue New Horizons as is or include more."

"Good magazine - needs to keep pace with changing FFA & kids needs. Recent articles on drugs & alcohol were good."

"Good timely articles that kids can relate too. I used the information on colleges, as part of a lesson, keep up the good work!!"

"I would like to have the opportunity to purchase bulk quantities of the magazine for delivery to one address...I believe that New Horizons should have 9-10 issues per year."

"It seems to take about 6 months to get their first issue after we send the roster in. This is too long. I don't know if it is a state office problem or a New Horizons problem."

"This is one of the better resources of information for all members (young or old) and also to use with prospective members."

Conclusions

Based on the findings of this survey, seven conclusions were formed:

1. The FFA New Horizons magazine is read extensively by both FFA members and advisors.

2. FFA members and advisors prefer articles of personal, local, or state interest and would like to see more articles containing career information in the FFA New Horizons magazine.

3. The most frequently read sections of the FFA New Horizons magazine were the cover story and the joke page.

4. The writing quality, paper quality, and photographs were the highest rated components of the magazine's layout and design.

5. The FFA members and advisors rated the FFA New Horizons magazine a 7 on a 10 point scale when compared to other magazines they usually read.

6. FFA members and advisors would both like to see the number of issues of the FFA New Horizons magazine increased.

7. A large majority of FFA members indicated they would pay more dues to support the FFA New Horizons magazine.

Recommendations

1. FFA New Horizons' staff should work with local FFA members and advisors to develop articles pertaining to local, state, and regional interests. Perhaps a national editorial advisory board could be considered.

2. FFA New Horizons' staff should place greater emphasis on frequently read sections of the magazine such as the cover story and joke page.

3. The editor and writers of the FFA New Horizons magazine should strive to maintain and improve the magazine's high quality layout and design features.

4. FFA New Horizons' staff should initiate the process to increase FFA dues to support more issues of the magazine each year.

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CENTRAL REGION READERSHIP SURVEY OF THE
FFA NEW HORIZONS MAGAZINE

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The paper demonstrates that the authors know how to conduct survey research. Evidence of that assessment includes the process used to develop and field test the instrument, attention paid to validity and reliability of the instrument, sampling plan, recognition of nonresponse concerns, and evidence that they are familiar with some literature about analyzing opinions of readers of publications. Since the substance (content) of the paper does not deal with an issue that is central to the core knowledge of agricultural education, the remainder of the critique pertains to process issues.

The authors report that "reliability coefficients ranged from .65 to .94." Since data are reported for individual items, the implication is that reliability coefficients were calculated for individual items. The procedures used to assess reliability of items should be more explicit.

Surveys of readers' opinions of publications like FFA New Horizons are particularly susceptible to reactive responses, since respondents are particularly cognizant of the social acceptability of reporting relatively high levels of readership. One way to investigate whether this type of response error may be present is to include a few items in the survey about fictitious articles or sections of the publication and compare responses to these items with responses to items that pertain to articles or features that actually appear.

Similarly, for surveys of this type the strategy of comparing early respondents with late respondents may not be the most appropriate strategy for assessing nonresponse error. A convincing argument could be made that nonrespondents may be primarily nonreaders, especially for the sample of FFA members. One strategy for exploring this possibility is to construct a "worse case scenario" and compare that interpretation with the interpretation based on the assumption of no nonresponse error. If all nonrespondents in the FFA sample were to respond "none" to the question about the percentage of the publication read, the percentages reported in Figure 2 would change from 3.5% "none" to 37%, and from 78% reading at least one-half of the magazine to 48% reading at least one-half of the magazine. Perhaps alternative strategies should be explored for assessing nonresponse error.

The percentages in the text summarizing the data presented in Figure 2 do not agree with percentages calculated from the data presented in the figure. The discrepancies are not major (2%-3%); however, inconsistencies such as this raise questions about quality and thoroughness. The authors quote a sample of FFA members' and advisers' comments that were written on the returned survey forms. The authors do not indicate the criteria used to select the comments that are quoted. The 12 comments quoted were chosen from how many comments? The reader needs to be assured that the authors have not selectively chosen comments that put a particular slant or bias on the findings.

ASSESSING THE INTENDED AND ACTUAL LEVELS OF COGNITION IN OHIO COOPERATIVE EXTENSION SERVICE COUNTY AGRICULTURAL AGENTS'/STATE AGRICULTURAL SPECIALISTS' INSTRUCTIONAL PROGRAMS

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Introduction

Since the establishment of the Cooperative Extension Service (CES) by the Smith-Lever Act in 1914, Extension has worked in concert with Land-grant universities and the agricultural experiment stations. Together, these institutions have helped raised the living standards of the American people. The establishment of the CES created a third component between the educational aspects of the Land-grant universities and the agricultural experiment stations. This tripartite responsibility has helped the American people to set goals and select appropriate educational programs (Boone, 1989).

With an emphasis on teaching, research, and extension; the Land-grant system is perceived internationally as one of the world's greatest achievements in non-formal education. As a result of the multi-functional dimension of the land-grant system, the CES carries out the non-formal educational function of the Land-grant Universities rather than limiting itself to the service function. Thus, teaching is a major component of the CES.

Boone (1989) defined Extension as a field of education aimed at teaching people in real life situations to enable them to identify and assess their own needs and problems and to inspire them to action. Raudabaugh (1974, p. 3) stated that the philosophy of Extension has been to teach people "how to think, not what to think."

The mission of the CES is to extend life long learning opportunities to the people of the United States (Prawl et al., 1984; Boone, 1989). Furthermore, Astroth and Robbins (1987) stated that the goal of Extension is to assist people in achieving what they desire through information and education. In carrying out the educational mission, the CES has developed its own educational principles and philosophy which are based on teaching-learning principles. Newcomb et al. (1986) stated that the success of any educational program depends on the quality of teaching and the relevance of the subject matter. Therefore, as CES continues to evolve in the coming decade, continual upgrading of the staff must be a high priority. A more specialized role has evolved for the agent encompassing responsibility for building a favorable climate for education and in developing problem solving capability in clientele.

Boyer (1987) reported great concern about creating environments and the cognitive development of educational participants by which higher order thinking could be delivered with appropriate intellectually stimulating information.

Henderson (1988) stated that "more effort should be expended on delivering knowledge that helps students (clientele) identify and solve problems rather than serving as a coordinator for transferring information from researchers to clients" (p. 1129). Therefore, Extension educators become an essential component in accomplishing the new challenging educational role (teaching-thinking) facing CES today. The challenge, then, is to develop the expertise of the Extension personnel as professional educators to enhance their ability to synthesize information and to effectively plan and deliver programs at higher cognitive levels.

In the last four decades, many taxonomies of educational objectives have been developed to classify the learning process, among them, The Taxonomy of Educational Objective: Cognitive Domain developed by Bloom, et al. (1956) to facilitate communication among educators engaged in testing, curriculum development, and research. The taxonomy is often used as the framework for planning, developing, implementing, monitoring and evaluating instructional variables (Stahl & Murphy, 1981). Studies show the taxonomy helps induce individual's thinking about learning behavior by making educational objectives clear to the learners (Gagne, 1965).

Purpose and Objectives

The purpose of this study was to describe levels of cognition of instruction and to investigate the relationships among levels of cognition and selected characteristics of Ohio Cooperative Extension Service (OCES) county agricultural agents and state agricultural specialists.

Specifically, objectives of the study were to:

1. describe the intended and actual levels of cognition for instruction in selected OCES programs;
2. ascertain the relationship between the intended level of cognition of instruction and the highest actual level of cognition of instruction of OCES programs;
3. ascertain the relationship among the intended and actual levels of cognition of instruction and selected characteristics of OCES county agricultural agents and state agricultural specialists; and
4. ascertain the relationship among the type of agricultural agents and selected characteristics of OCES county agricultural agents and state agricultural specialists.

Procedures

Research Design

Since subjects could not be randomly assigned to experimental and control groups, and levels of the treatment could not be randomly assigned, the design of this study was *ex post facto* research.

Population and Sample

The target and accessible population of this study consisted of all Ohio county agricultural agents (N=73) and state agricultural specialists (N=72) obtained from 1990 updated lists secured from the OCES. The total population for the study was 145. The sample size consisted of 15 county agricultural agents and 15 state agricultural specialists selected randomly from the population. The sample size was determined based on the formula 10 x (K + 1), where K is the number of main independent variables of interests in this study, which were two in number (McCallum, 1989). This sample was viewed as a slice of time of the target population of all county agricultural agents and state agricultural specialists. A stratified random sampling technique was utilized to select the 15 county agricultural agents and systematic random sample was used to select the 15 state agricultural specialists selecting every fifth person with a random start from the list obtained from the OCES Headquarters Faculty and Staff Directory.

Data Collection

Three methods of data collection were used: audio taping, interviews, and questionnaires. The data were collected from January to June, 1991, from the 30 county agricultural agents and stage agricultural specialists.

Instrumentation

Three instruments were utilized to obtain the information needed to address the research objectives of this study. These instruments were: (1) an existing interview schedule developed by Kitinoja and Miller (1989) to assess the highest intended level of cognition, (2) the modified Florida Taxonomy of Cognitive Behavior (FTCB) Instrument to assess the highest actual level of cognition, and (3) a demographic questionnaire developed by the researcher to collect data related to the rival independent variables.

Content validity of the interview schedule and demographic questionnaire were determined using a panel of experts. The inter-rater reliability of the interview schedule and FTCB instrument were determined using a panel of experts (percent of agreement was 82.7% and 81.3% respectively). Intra-rater reliability of FTCB instrument was assessed by computing the percent of agreement upon a given tape rated twice with an interval of one week between the first and second rating (r= 96%).

Analysis of Data

Descriptive statistics (frequencies, percentages, measures of central tendency and variability) were used to describe the independent variables and dependent variable. Correlations (Pearson correlation coefficients, Phi coefficients, Point Biserial, Biserial, and Kendalls Tau c) were used to determine the direction and the magnitude of the relationships among variables. One-way analysis of variance and t-tests were used to test the differences (α=.05) among the mean levels of cognition on selected variables of interest.

Results

A typical county agricultural agent who participated in this study had 15.7 years of experience, completed 2 pedagogical courses, enrolled in 20 (median) hours of andragogy, a master's degree of science or arts in his/her college education, social science as the field of study, emphasized both farm management/community development and plant/animal production, and spent most of his/her time in agriculture programming.

A typical state agricultural specialist who participated in this study had 17.5 years of experience, completed 1 pedagogical course, enrolled in 10 (Median) hours in andragogy, a doctorate/DVM degree, a technical area as the field of study for the degree, emphasized plant/animal production program area only, and spent most of his/her time in Extension.

Differences Between Highest Intended and Actual Levels of Cognition of County Agricultural Agents/State Agricultural Specialists

Table 1 presents the results of the t-test on the highest average levels of cognition for the differences between the highest intended and actual levels of both county agricultural agents and state agricultural specialists. County agricultural agents' and state agricultural specialists' average highest intended level of cognition was 3.97 (Analysis) while their average highest actual level of cognition was 4.57 (between Analysis and Synthesis). There was a statistically significant difference between the averages for the highest intended and actual levels of cognition of county agricultural agents and state agricultural specialists at the .05 level of significance.

Table 1

t-test of Significance Difference Between Highest Intended and Highest Actual Levels of Cognition of County Agricultural Agents and State Agricultural Specialists

Cognitive Type	n	M	SD	t
Intended	30	3.97	1.56	2.07*
Actual	30	4.56	.90	

* $p < .05$

Differences Between Type of Agricultural Agent, Major Field of Study and Levels of Cognition

Table 2 presents the results of the t-test of significant differences on the average highest levels of cognition for type of agricultural agent and major field of study. The county agricultural agents' average highest actual level of cognition was 4.27 (above Analysis) and state agricultural specialists' average highest actual level of cognition was 4.87 (near Synthesis) No significant difference was found between the average for the highest actual levels of cognition of the county agricultural agents and state agricultural specialists at the .05 level.

However, a statistically significant difference was found between the averages of the highest intended levels of cognition of the county agents (3.27: above Application) and state agricultural specialists (4.67: near Synthesis). Also, the average highest level of cognition for county agricultural agents and state agricultural specialists who earned social science degrees was 3.08 (near Application) while the average highest intended level for county agricultural agents and state specialists who earned technical studies degrees was 4.65 (near Synthesis). Therefore, county agricultural agents and state agricultural specialists with degrees in technical fields of study intended to deliver the OCES programs at higher levels of cognition than those with social science degrees (Table 2). The results in Table 2 indicate that they did not differ significantly in the level at which they actually delivered instruction, however.

Intended Level of Cognition by Major Program Area of Emphasis

Significant differences were found among the highest average intended levels of cognition of the three major program areas emphasized in 1991/92 (M = 5.33, 2.25 and 3.9) at the .05 level of significance (Table 3). The results of Tukey post-hoc analysis revealed significant differences between the mean highest intended levels of cognition of farm management/community development program area only (M =2.25) and plant/animal production program area only (M =5.33).

Table 2

t-tests of Significance Differences Between Type of Agent, Major Field of Study and Highest Levels of Cognition

	Cognitive Type							
Variables	Intended				Actual			
	n	M	SD	t	n	M	SD	t
Agent Type								
County	15	3.3	.88	-2.7*	15	4.3	.88	-1.9
State	15	4.7	1.8		15	4.9	1.8	
Major Field of Study								
Social	13	3.1	.86	-3.1*	13	4.4	.87	-.92
Technical		17	4.7	1.7		17	4.7	.92

* $p < .05$

Table 3

Analysis of Variance of Intended Level of Cognition by Major Program Area Emphasized in 1991/92

	Program Area Emphasis			
	Fmgt/CD[1]		P/A PROD[2]	Both[3]
M	2.25		5.33	3.90
SD	0.50		1.63	1.33
Source	df	SS	MS	F
Between groups	2	23.08	11.54	6.51*
Within groups	27	47.88	1.77	
Total	29	70.97		

* $p < .05$
[1] FMGT/CD = Farm Management and Community Development Only
[2] PA/PROD = Plan and Animal Production Only
[3] both Areas of Emphasis

Relationships Among Highest Levels of Cognition, Type of Agricultural Agents, and Selected Demographic Characteristics

The results in Table 4 indicate that a negative moderate association between the highest intended level of cognition and years of experience ($r = -0.46$). As the number of years of experience of the county agricultural agents and state agricultural specialists increased, the highest intended level of cognition tended to decreased. A positive substantial association was noted between the highest intended level of cognition and field of study in bachelor, masters, and doctorate/DVM degrees earned in social science and technical studies ($r_{pb} = 0.51$). County agricultural agents and state agricultural specialists with technical studies degrees intended to deliver the OCES program at higher levels of cognition than county agricultural agents and state agricultural specialists with social science degrees.

A positive moderate association was found between highest intended level of cognition and degrees completed as

bachelors, masters, and doctorate/DVM (τ_c = 0.36). The higher the degree completed, then the higher the highest intended level of cognition, i.e., state agricultural specialists with a doctorate/DVM degree tended to plan the OCES programs at higher intended levels of cognition.

The results in Table 5 indicate that a negative moderate association existed between county agricultural agents' highest intended level of cognition and the percent of time they spent on other job responsibilities such as 4-H programming, home owner horticulture, multi-county, and service to their college/profession (r = -0.33). This indicates that as the percent of time spent on other job responsibilities tended to decreased, county agricultural agents' highest intended level of cognition increased.

A positive moderate association was found between state agricultural specialists' highest intended level of cognition and the percent of time spent in resident instruction (r = 0.35). State agricultural specialists' highest intended level of cognition tended to increase as the percent of time spent in resident instruction increased.

Table 4

Relationship Among Highest Levels of Cognition of Instruction, Type of Agent, and Selected Demographic Characteristics

Characteristics	Intended	Actual	Type of Agent
Years of experience	-0.46	0.16	0.21[b]
Number of pedagogy courses completed	-0.14	-0.07	-0.23[b]
Number of hours in andragogy	-0.03	-0.11	-0.16[b]
Degree completed[1]	0.36[a]	0.29[a]	0.95[c]
Program area[2]	0.17[b]	0.15[b]	0.51[d]
Field of study[3]	0.51[b]	0.18[b]	0.47[d]

[a] Kendalls τ_c
[b] Point Biserial
[c] Biserial
[d] ϕ coefficient
[1] Bachelor of Science or Arts; Master of Science or Arts; and Doctorate/DVM degree.
[2] Farm management/community development only; plant/animal production only; and both areas.
[3] Social science or technical studies.

Table 5

Correlation Among Distribution of County Agricultural Agents'/State Agricultural Specialists' Job Responsibilities and Highest Intended and Actual Levels of Cognition

Responsibilities	County Agents		Responsibilities	State Specialists	
% of Time	Intended	Actual	% of Time	Intended	Actual
Agriculture programming	-0.11	-0.28	Extension	0.05	0.34
County chair	-0.07	0.19	Resident instruction	0.35	-0.33
CNRD programming	0.22	0.50	Research	0.20	-0.34
Other % of time	-0.33	-0.93			

The results in Table 4 indicate a positive low association between highest actual level of cognition and degree completed (τ_c = 0.29). The higher the degree completed; the higher the highest actual level of cognition, i. e., county agricultural agents and state agricultural specialists with doctorate/DVM degrees displayed higher actual levels of cognition.

The correlations in Table 5 indicate a negative very strong association between county agricultural agents' highest actual level of cognition and percent of time spent in other job responsibilities such as 4-H programming, home owners horticulture and multi-county and service to their college/profession (r = -0.93). As percent of time spent on other job responsibilities decreased, county agricultural agents actually delivered the OCES programs at higher levels of cognition. A positive substantial association was found between county agricultural agents' highest actual level of cognition and percent of time spent in CNRD programming (r = 0.50). County agricultural agents' highest actual level of cognition in delivering the OCES programs tended to increase as their percent of time spent in CNRD programming increased. A negative low association was found between county agricultural agents' highest actual level of cognition and percent of time spent in agriculture programming (r = -0.28). County agricultural agents' highest actual level of cognition in delivering the OCES programs tended to increase as their percent of time spent in agriculture programming decreased.

A positive moderate association was found between state agricultural specialists' highest actual level of cognition and the percent of time they spent in extension (r = 0.34). State agricultural specialists tended to actually deliver the OCES programs at higher cognitive levels as their percent of time spent in extension increased. Negative moderate associations were found between state agricultural specialists' highest actual level of cognition and the percent of time they spent in resident instruction and in research (r

= -0.33 and r = -0.34, respectively). State agricultural specialists' highest actual level of cognition of delivering the OCES programs tended to increase as the percent of time they spent in resident instruction and research decreased (Table 5).

The results in Table 4 indicate a positive very strong association between type of agricultural agent and degree completed (r_b = 0.95). More state agricultural specialists had completed advanced degrees (PhD/DVM) than county agricultural agents. A positive substantial association was found between program area emphasized in 1991/92 and type of agricultural agents (ϕ = 0.51). State agricultural specialists emphasized both farm management/community development and plant/animal production types of programs. A positive moderate association was found between type of agricultural agents and field of study as social science or technical studies (ϕ = 0.47). The majority of state agricultural specialists had completed technical studies degrees.

Conclusions and/or Recommendations

Based on the findings from this study, the following conclusions can be made for the population of the county agricultural agents and state agricultural specialists from which the random sample was drawn in 1990/91.

1. County agricultural agents and state agricultural specialists delivered the OCES programs at higher actual cognitive levels than they originally intended.
2. State agricultural specialists planned the OCES programs at higher intended levels of cognition than county agricultural agents.
3. County agricultural agents and state agricultural specialists in the plant/animal production program area only planned to teach at higher intended levels of cognition (synthesis) than the county agricultural agents and state agricultural specialists teaching the farm management/community development program area only.
4. Less experienced county agricultural agents and state agricultural specialists tended to deliver the OCES programs at higher intended level of cognition.
5. County agricultural agents with fewer job responsibilities in agriculture programming delivered the OCES programs at higher actual level of cognition, whereas state agricultural specialists with a higher proportion of their job responsibilities in extension delivered the OCES programs at higher actual level of cognition.
6. County agricultural agents and state agricultural specialists with degrees in technical studies planned the OCES programs at higher intended levels of cognition than county agricultural agents and state agricultural specialists with social science degrees.

7. State agricultural specialists with doctorate/DVM degrees delivered the OCES programs at higher intended levels of cognition than county agricultural agents with master's degrees.

8. County agricultural agents who spent less time on other job responsibilities were inclined toward delivering the OCES programs at higher intended and actual levels of cognition than county agricultural agents and state agricultural specialists who spent more time on other job responsibilities.

9. State agricultural specialists tended to plan to deliver the OCES programs at higher intended levels of cognition as their percentage of time spent in resident instruction increased. However, as percent of time spent in resident instruction decreased, state agricultural specialists delivered the OCES programs at higher actual level of cognition.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are made for six groups: the county agricultural agents, the state agricultural specialists, the OCES administrators, the Department of Agricultural Education, the technical departments in the College of Agriculture, and the College of Agriculture.

1. County agricultural agents and state agricultural specialists should place more emphasis on planning and delivering the OCES programs at the higher levels of cognition (synthesis and evaluation). However, there is no ideal percent of time to be recommended to be spent at each level of cognition. Such levels would be based on the needs of the learners and the nature of the instructional content.

2. County agricultural agents and state agricultural specialists should attend workshops conducted by the Department of Agricultural Education or OCES to familiarize themselves with the use of the taxonomies of educational objectives such as Bloom's Taxonomy, or the Newcomb and Trefz Model.

3. The OCES should hire individuals who have knowledge about taxonomies of educational objectives.

4. Regardless of an agent's position, education, and experience; in-service training programs on the use of the taxonomies of education objectives should be part of the agent's professional growth.

5. The OCES should tie the teaching portion of performance appraisal of its county agricultural agents and state agricultural specialists to the use of Taxonomies of Educational Objectives.

6. The OCES should educate district directors or establish a team of faculty with expertise in teaching techniques and knowledgeable in the Taxonomies of Educational Objectives to observe county agricultural agents and state agricultural specialists teaching and provide feedback for improvement.

7. The Department of Agricultural Education should review the courses offered, related to teaching methods, and emphasize the application of the principles of teaching and learning at higher cognitive levels.

8. Technical departments in the College of Agriculture should encourage their students to take courses in teaching methods during their undergraduate program, or during their graduate program if none was taken previously.

9. The College of Agriculture should endorse the development of higher order teaching and/or thinking skills in its students.

Need for Further Study

1. The study needs to be replicated with a larger sample of all Cooperative Extension Service (CES) programs in Ohio and other states to determine the levels of cognition at which the different types of agents in the different programs plan and actually deliver the CES programs.

2. Another study is needed to determine the intended and actual levels of cognition based on subject matter taught.

3. A study is needed to assess the achievement of the clientele who participated in the extension service programs.

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ASSESSING THE INTENDED AND ACTUAL LEVELS OF COGNITION IN OHIO COOPERATIVE EXTENSION SERVICE COUNTY AGRICULTURAL AGENTS/STATE AGRICULTURAL SPECIALISTS INSTRUCTIONAL PROGRAMS

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Significance of the study

This study addresses a significant question of determining the relationship of intended and actual levels of cognition of instruction planned by county agricultural agents and state agricultural specialists. This a significant question because the time certainly has come for extension personnel to be more than conveyors of information from the researcher to the client. In fact, information per se is so abundantly available that one may find it difficult to justify the existence of the Cooperative Extension Service if that is all they are delivering. Clearly, providing clients with instruction that will assist them in problem solving and being capable of critical thinking is of enormous value. The researchers literature review clearly provided a basis and justification for extension educators designing and delivering instruction that assists their clients in thinking and decision making.

Methodology

The research design appears, to this reviewer, to be appropriate and carefully framed. The sample size and selection were appropriate. The instrumention appeared to be well documented, however, the reviewer was somewhat uninformed as to the use and association of the audio taping, interviews and questionnaire methods. A bit more clarity in describing data collection and instrumentation use would be helpful. Generally the analysis of data and presentation of results were appropriate. However, the description of the tables assumes that the reader has full knowledge of the levels represented by application, analysis, synthesis and evaluation. There were also some errors in the text which forced the reviewer to read and reread the description to gain an understanding of the results. This lack of description on how intended and actual levels of cognition were derived made the review somewhat difficult.

Conclusions and recommendations

The conclusions were drawn from the data and were appropriate. The key issue to note is that both agricultural agents and specialists delivered programs at higher levels than they originally intended. One wonders why the plant and animal program areas planned to teach at higher levels than those in farm management and community development where higher order thinking is so vitally important. The issue of extension personnel with degrees in the technical fields of agriculture being able to plan programs at higher intended levels than those with social science degrees should provide a basis for interesting discussion in most states. The authors are to be commended for providing valuable insight for extension personnel preparation.

PERCEPTIONS, RESPONSES AND KNOWLEDGE ABOUT DIVERSITY BY EXTENSION ADMINISTRATORS

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Introduction

> USDA must value the diversity of its work force and the public we serve. The national and international economic, social and technological forces that will shape the Department's mission demand that we understand and respect diversity. We must deliver our programs effectively to a culturally diverse population and become more heterogeneous in work force composition. (United States Department of Agriculture, 1990, p. 6.)

A review of recent literature reveals that the Cooperative Extension System must place an increased emphasis on becoming a multicultural organization (USDA, 1990; Strategic Planning Task Force on Diversity, 1990; Deville, 1991; Thomas, 1991; ES Strategic Planning Council, 1991; Skinner, 1991). "A multicultural organization is one which is genuinely committed to diverse representation in its membership, is sensitive to maintaining an open, supportive and responsive environment, is working toward and purposefully including elements of diverse cultures in its on-going operations, and ... is authentic in its response to issues confronting it" (Barr and Strong, 1987, p. 85).

A key to establishing a multicultural organization appears to be administrators who are competent in the area of diversity (Deville, 1991). Barr and Strong, (1987) and others indicate that any successful effort to achieve diversity will not be initiated from a human resources department. To succeed, a multicultural organization requires personnel and attitude changes from the top down. Programs which involve only the less powerful professionals in an organization permit the organization to embrace multiculturalism by claiming it wants to eliminate oppressive barriers and include under-represented groups without making changes in top management practices (Simons, 1989).

As an organization, the Extension System must look at itself raising the questions: Are we valuing diversity? Are middle and upper level management culturally sensitive and able to manage a culturally diverse work force? Do we understand the impact of culture on communication and performance? A values audit of Ohio extension personnel (Safrit, Conklin and Jones, 1991) indicated that diversity was not highly valued by members of Ohio's Extension Organization. Based on the findings of Safrit, Conklin, and Jones (1991) and the review of literature (Deville, 1991; Simons, 1984; Cox, 1991; Barr and Strong, 1987), a need to determine the current knowledge and response of extension administrators towards diversity issues was warranted. Additional

information was needed about the knowledge and response of upper and middle managers, including: administrative cabinet, administrative support team and county chairs.

Purpose and Objectives

The purpose of the study was to determine the knowledge and response of extension administrators to diversity issues.

To guide the study, the following research questions were formulated:

1. What was the level of response to diversity that the extension organization reached?
2. What were critical diversity issues affecting the extension organization?
3. What was the diversity knowledge level of extension administrators?

Procedures

The population for the descriptive study included a census of all members of: Administrative Cabinet (N=12); Organizational Support Team (N=8); County Chairs (N=87) and District Specialists with support team responsibility (N=20).

The population can be more clearly identified by the following description:

Administrative Cabinet: Director, Associate Director, Assistant Directors for Agriculture, Home Economics, Community and Natural Resource Development, 4-H/Youth Development, Five District Directors, Department Chair representative, Head of Information and Applied Communication. Administrative Cabinet is the policy making body of the Ohio State University Extension. In cooperation with the Administrative Support Team, members implement policies and directions established for the organization and have overall responsibility for management of the organization and its personnel.

Administrative Support Team: Personnel Leader, Organizational Development Leader, Staff Development Leader, Program Development Leader, Leader Special Projects, Manager of Business Operations, Leader Computer Services, Leader Evaluation.

County Chairpersons include individuals providing administrative leadership to the 88 county extension programs in Ohio. The primary responsibility for most county chairs was program delivery to clientele.

District Specialists with Support Team Roles include individuals who provide both program and professional development support to county staff. District Specialists work out of a regional office.

A four part written questionnaire was developed to collect data. Questions on the questionnaire were adapted from survey instruments developed by Simons and Tulin (1991) and Thomas (1991). Part I (Organizational Response Level) of the questionnaire consisted of eleven indicators which described different levels an organization could reach in becoming aware of and responding to diversity in the work place. A ladder-like grid was developed and respondents marked the level which most appropriately described their part of the organization.

Part II (Critical Issues) of the questionnaire identified 22 critical issues within the extension organization related to diversity. Respondents were asked to rank each issue using a Lickert type scale where 1 = Non-existent, 2 = Insignificant, 3 = Noteworthy, 4 = Important and 5 = Urgent. Part III (Diversity Awareness Assessment) consisted of 23 multiple choice questions which measured the factual knowledge level of respondents on diversity issues against research findings . Part IV (Culture Audit) of the questionnaire gathered demographic information.

Validity was established utilizing a panel of experts on research design, diversity in organizations, and knowledge of diversity from Ohio State University and ES-USDA. Reliability for the Diversity Awareness Assessment (Part III) was established using the test retest procedure (r=.78). The instrument had an overall reliability (Cronbach alpha) co-efficient of .62.

The questionnaires were administered during two administrative meetings in May of 1992. The Administrative Cabinet and Organizational Support Team were present at one meeting. County Chairs and District Specialists were present at the second meeting. The overall response rate was 85%. Response rate by administrative strata was as follows: Administrative Cabinet (100%); Administrative Support Team (100%); County Chairs (86%); and District Specialists (55%).

Data Analysis

Data were analyzed utilizing the SPSS computer program. Descriptive statistics were used.

Results

Organizational Response Level

Perspectives varied on where the organization was in responding to diversity issues. The group as a whole was not in agreement, but indicated that issues were being discussed and acknowledged. Table I reports that 16% of the administrators indicated that the extension service has reached the level at which people were actively acknowledging diversity as an issue. Sixteen percent

indicated changes had to be made to deal with diversity and 15% indicated that the organization had created an open forum for discussion. However, 13% felt the issue of diversity was being discussed privately and in informal groups and 4% indicated that there was denial, anger, frustration, and conflict in dealing with diversity within the organization. One respondents (1%) indicated there was an overall plan to deal with diversity. None of the respondents indicated that there was an evaluation process set-up to check the progress being made toward diversity.

Table I **Organization Response to Diversity in the Work Place (N = 108)**

		f	%	Valid %
I	There is little or *no awareness* of diversity as an issue	6	5.6	7.2
II	There is *denial*, anger, frustration and *conflict*.	3	2.8	3.6
III	People are *actively acknowledging* that diversity is an issue.	13	12.0	15.7
IV	The issues are being *discussed privately* and in informal groups.	11	10.2	13.3
V	We have created an *open forum* for discussion.	12	11.1	14.5
VI	We have decided that *changes* have to be made.	13	12.0	15.7
VII	There is a *corporate vision* about the role of diversity in the organization.	10	9.3	12.0
VIII	*Policies* are being set in line with the vision.	5	4.6	6.0
IX	*Disconnected efforts* are taking place.	9	8.3	10.8
X	There is an *overall plan* and *concentrated effort* to deal with the issues.	1	.9	1.2
XI	There is an *evaluation process* set up to check our progress	0	0.0	0.0
	Missing data	25	23.1	Missing
		108	100%	100%

Critical Issues

Administrators were asked to rate 22 issues related to diversity on a scale of 1 to 5 (1=non-existent, 2=insignificant, 3=noteworthy, 4=important, 5=urgent) based on their assessment of how critical the issue was to the organization. Ratings ranged from a mean score of 3.45 (σ .90) to 2.25 (σ 1.14). Table II reports the results. The issues identified as the most critical were: 1) confusion about how to communicate and serve clientele from other backgrounds; 2) understanding how to use the different strengths of individuals; 3) lack of a clear vision of what a multi-cultural organization could achieve; and 4) recruitment program fails to attract diverse applicants. None of the 22 items were identified as "nonexistent". Ten items received a rating of 3 or above, indicating "noteworthy" of concern.

Table II **Rank Order of Critical Issues - Level of Importance**
(N = 108)

Item	f	μ	σ
Confusion about how to communicate with and serve clientele from other backgrounds	107	3.45	.90
Understanding of how to use the different strengths of individuals	106	3.39	.90
Lack of clear vision of what a multi-cultural organization could be or could achieve	106	3.37	.94
Recruitment program fails to attract diverse applicants	107	3.35	1.06
Different senses of time and urgency about dealing with diversity	107	3.24	.82
Lack of role models or mentors	107	3.22	1.01
Communication problems	107	3.20	.98
Lack of training or resources to deal with diversity	107	3.14	.91
Administrators lack skills to work with individuals from diverse backgrounds	105	3.13	.97
Inequities in pay scale, promotion, or job definition	104	3.00	1.24
Public media does not reflect diversity	106	2.94	.98
Double standards	106	2.93	1.17
Poor feedback on performance	105	2.92	1.09
"We" vs. "they" distinctions	107	2.88	1.08
People feeling "put down"	107	2.84	1.08
Inadequate or non-existent child care	104	2.81	1.12
Offensive slurs, jokes, stereotyped remarks	107	2.79	.86
Insensitive or non-inclusive language (sexist, racist, etc.)	107	2.74	.94
Dead end jobs	106	2.70	1.05
Violations of work rules, policies, procedures	104	2.42	1.08
Sexual harassment	104	2.35	.99
Sabotage or harassment of certain groups or individuals	106	2.25	1.14

Scale: 1 = non-existent; 2 = Insignificant; 3 = Noteworthy; 4 = Important; 5 = Urgent

From the list of 22 items the administrators were asked to identify the three critical issues which were most evident. Table III reports the results which substantiated the priority issues of: communication with clientele, recruitment, vision and use of individual strengths. Several other issues were also identified they included: lack of role models and inequities in pay scale and promotion opportunities.

Table III **Most Critical Issues as Identified by Respondents (N = 108)**

Item	f	%
Confusion about how to communicate with and serve clientele from other backgrounds	32	10.2
Recruitment program fails to attract diverse applicants	28	8.9
Understanding of how to use the different strengths of individuals	27	8.6
Lack of clear vision of what a multi-cultural organization could be or could achieve	27	8.6
Lack of role models or mentors	26	8.3
Inequities in pay scale, promotion, or job definition	22	7.0

Each respondent could identify up to 3 items (unranked) from the 22 items listed in Table II or add others.

Diversity Awareness Assessment

The diversity knowledge level of the administrators was measured utilizing a 23 item multiple-choice test in which the one correct response to each item was research or fact based. The results yielded a mean score of 15.04 (σ 3.67) which equates to a 65% correct response rate. The range of scores was from 0 correct to 21 correct. Over 59% of the administrators had scores below the 70th percentile. Table IV reports the results.

Table IV **Number and Percent Correct on Diversity Awareness Assessment (N = 108)**

Number of Correct Responses*	f	%	cp
0	1	.9	.9
6	1	.9	1.9
8	2	1.9	3.7
9	4	3.7	7.4
10	6	5.6	13.0
11	7	6.5	19.4
12	6	5.6	25.0
13	4	3.7	28.7
14	7	6.5	35.2
15	12	11.1	46.3
16	14	13.0	59.3
17	17	15.7	75.0
18	9	8.3	83.3
19	9	8.3	91.7
20	7	6.5	98.1
21	2	1.9	100.0
	108	100%	

μ = 15.04 σ = 3.67 *Maximum number correct possible = 23

Cultural Audit

Experience in an Administrative position ranged from one year (f=19) to 35 years (f=1). For all respondents, the mean number of years in the current position was 5.5 (σ 5.15) years. Seventy-three percent (73%) of the respondents have six years or less of experience in their present position. See Table V.

Respondents included: 54% (57) males and 46% (50) females. 95% (104) identified themselves as white, 2% (2) as Hispanic, 1% (1) as American Indian, and 1% (1) as African American. Eighty-six percent (93) described themselves as having experience supervising someone "different" (of another race, gender or sexual orientation) from themselves. In describing their level of experience, 12% (13) indicated limited experience, 25% (27) listed considerable experience and 50% (54) placed themselves between the two extremes. Thirteen percent (14) did not respond to the question.

Table V **Years in Current Administrative Position**
(N = 108)

No. Years	f	%	cp
1	19	17.8	17.8
2	10	9.3	27.1
3	15	14.0	41.1
4	15	14.0	55.1
5	15	14.0	69.2
6	4	3.7	72.9
7	6	5.6	78.5
8	5	4.7	83.2
9	1	.9	84.1
10	3	2.8	86.9
11	4	3.7	90.7
12	1	.9	91.6
13	2	1.9	93.5
14	2	1.9	95.3
16	2	1.9	97.2
20	1	.9	98.1
24	1	.9	99.1
35	1	.9	100.0
Missing	1	Missing	
	108	100.0%	

$\mu = 5.47 \quad \sigma = 5.16$

When asked to indicate their level of optimism or pessimism regarding the organization's progress in providing equal opportunity to all employees, reactions varied. Responses ranged from very pessimistic (2%) to very optimistic (10%). Forty-eight percent (48%) indicated they were "somewhat optimistic" about the organization providing equal opportunity. The mean score of 3.47 (σ .96) was closest to the rating scale item of 3.0 which indicated neither optimism nor pessimism. (Table VI).

Table VI **Level of Optimism/Pessimism Regarding Organization's Progress in Providing Equal Opportunity**
(N = 108)

Level	f	%	cp
1) Very pessimistic	2	1.9	1.9
2) Somewhat pessimistic	19	17.6	19.4
3) Neither	24	22.2	41.7
4) Somewhat Optimistic	52	48.1	89.8
5) Very Optimistic	11	10.2	100.0
	108	100.0	

$\mu = 3.47 \quad \sigma = .96$

Seventy-five administrators (69%) indicated they have had a mentor. Most indicated one (f=22) or two (f=20) mentors. Of those having mentors, 67% found their mentor relationship very helpful.

Conclusions and Recommendations

Conclusions

Administrators indicated that diversity issues were being discussed. The administrators acknowledged that changes had to be made, but that there was no overall plan or evaluation process in place.

The most critical issues to be addressed included: 1) confusion about how to communicate and serve clientele from other backgrounds; 2) understanding how to use the different strengths of individuals; 3) lack of a clear vision of what a multicultural organization could achieve; and 4) recruitment programs fail to attract diverse applicants.

Administrators scored below average on their knowledge of diversity issues as measured by the Diversity Awareness Assessment. A 65% correct response rate was the mean of the group.

Extension Administrators have limited experience in their current position. Seventy percent (70%) have less than six years of experience in their present position. Most (86%) describe themselves as having experience in supervising someone "different" from themself (of another gender, race, or sexual orientation). Ninety-five percent of the administrators were white, 54% were male.

Slightly more than half of the administrators indicated they were optimistic about the progress the organization was making in providing equal opportunity to all employees. Twenty percent (20%) indicated pessimism and 22% indicated neither optimism or pessimism.

Recommendations

The data indicates Extension Administrators studied perceived that the Extension System has not yet reached its goal of becoming a multi-cultural organization. The administrators stated that the organization was at a stage where change needs to occur. The lack of an overall plan or concentrated effort to deal with diversity issues was identified. The goal of diversity in any organization cannot be met until policies which are in line with the vision are established and imbued by the organization (Wurzel, 1988). It is recommended that the Extension System create an action task force whose primary responsibility would be to develop the needed vision and policies through an action plan which includes evaluation and accountability guidelines.

The action task force could begin by clarifying the organization's vision of diversity. An audit of the Extension "corporate culture" should be conducted to assist the organization in determining what the present culture looks like. By studying some of the current systems (promotion, mentoring and sponsorship, performance appraisal, staff development, employment practice) insights into the corporate culture can be gained.

The results indicated there was confusion about how to communicate with and serve clientele from other backgrounds. Administrators also indicated a need to learn more about using the different strengths of individuals. In achieving diversity, training programs for all the staff will be needed. It is recommended that administrators participate in staff development programs which are aimed at managing diversity, communicating across cultures and incorporating diversity into the work place. Experiential training programs to help all levels of administrators understand and recognize how biases may effect an individual's ability to manage a diverse work force are advisable. Administrators in a multicultural organization must escape the mind set that all workers are similar and put aside the assumption that they are managing people who are like them or aspire to be like them.

Extension administrators need to become more knowledgeable regarding diversity issues and aware of the differences between dominant and minority cultures. Key questions these Extension staff members must ask include: "How am I adapting myself to the diverse backgrounds of the people with whom I work? As an administrator, how do I evaluate the people I interview? Do I treat each individual as if diversity made no difference? Do I value and assess each person as a unique individual? One of the critical issues identified was a recruitment program which fails to attract diverse applicants. An audit of the recruitment program should be conducted to identify strengths and areas for change. In addition, it is recommended that the Extension organization secure the services and advice of a professional recruitment firm specializing in the recruitment of diverse applicants.

The study also identified a limited number of non-white administrators and indicated that only 69% of all administrators identified a mentor or role model. It is important that Extension move beyond affirmative action and the assumption that "if we fill the pipeline with *qualified* minorities and women, we can solve our upward mobility problems. Once recruited, they will perform in accordance with our promotion criteria and move naturally up our regular development ladder" (Thomas, 1991, p. 110). Extension currently has 46% of its administrators who are female. It is suggested that these administrators be studied to determine if they are experiencing frustration related to promotion and advancement.

Extension may wish to consider establishing a mentoring system not only for new staff, but for individuals interested in moving into and upward in management positions. This might be similar, although less formal than the "supervisor-in-training" program once established by Ohio's Cooperative Extension Service.

Further research needs to be conducted in other states with Extension administrators to determine if the results of the current study are unique to one state. In addition, data should be collected from other Extension personnel to determine if their knowledge and response to diversity issues is the same as the administrators. Finally, the use of focus group interviews is suggested to add qualitative information to the current descriptive survey research.

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PERCEPTIONS, RESPONSES AND KNOWLEDGE ABOUT DIVERSITY BY EXTENSION ADMINISTRATORS.

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Significance of the study

The researchers have addressed a question that is certainly a popular and current issue. Multicultural and cultural diversity are words that bring forth, debate, discussion and a searching for how to eliminate oppressive barriers. In focusing their investigation around the Extension system, the leadership in extension administration were asked to provide an insight as to issues affecting the organization and knowledge level possessed.

Methodology

The purpose and procedures for the study were clearly outlined. The study was carefully framed. The population for this investigation was the entire extension administrative staff in Ohio. The instruments used were apparently adapted from existing tools. Validity and reliability of the instrument was described and appeared to be appropriate. Since it was administered to the entire population during two meetings, one is left to wonder about the response rate particularly of the County Chairs (86%) and the District Specialists (55%). Although the overall response rate is high, no mention is made of why non-respondents could (obviously not in attendance) not have been contacted and followed-up for their imput. Granted, the number of actual non-respondents is somewhat small (approximately 23%) it would be helpful to know the position of the non-respondents. The data are presented in a clear and simple manner. The descriptive statistics were appropriate. The tables are simple, straightforward and provide a clear view of the data presented.

Conclusions and recommendations

The conclusions drawn from the study were appropriate. Clearly the conclusions were drawn directly from the findings. The recommendations appeared to be proper suggesting the development of a plan and policies for guideline development. The results provide an overview of the knowledge level, critical issues, diversity awareness plus a cultural audit of existing personnel. To this reviewer, it seems that some of the discussions in the recommendations were carried a bit beyond the evidence provided in the study.

Overall this was a helpful study and gave real insight into a very current issue.

WOMEN WHO SHATTERED THE GLASS CEILING: CASE STUDIES OF THE ASPIRATIONS, VALUES, MOTIVES AND ACTIONS OF WOMEN SERVING AS ADMINISTRATORS FOR COOPERATIVE EXTENSION SYSTEMS

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Introduction

The term glass ceiling refers to artificial barriers based on attitudinal or organizational bias that prevent qualified women from advancing into mid- and senior-level administrative positions (U.S. Department of Labor, 1991). The glass ceiling may exist at different levels in different organizations. Many women have paid their dues, even a premium, for a chance at a top position, only to find a glass ceiling between them and their goal.

Women make up 40 percent of a loosely defined demographic category of managers and administrators that covers everyone from President Bush to the person running the local Dairy Queen (U.S. Department of Labor, 1990). But only 15 percent of the top levels of power, from the military to board rooms, are occupied by women, and females are not in the zone for promotion to those jobs anytime soon (Fierman, 1990). A study by the University of California at Los Angeles Graduate School of Management and corporate recruiter Korn/Ferry International reported that only three of every 100 top executive jobs at the largest U.S. companies are held by women--a number that has barely budged in a decade (Saltzman, 1991).

The fourth Annual Status Report of Women at The Ohio State University (1992), one of the largest land grant universities in the U.S., reported that 41 percent of the university's executive positions are filled by females, a three percent increase since the first report was released in 1989. Within the larger land-grant university concept exists the Cooperative Extension System (CES), providing research-based educational programs to the citizens of the state. In 1989, seven women served as state CES directors, the organization's equivalent to chief executive officer, and one was an acting director. All women appointed to director positions since 1978 still held those positions in Spring 1989 when 15 percent of state directors were women (Goering, 1990). At the time of this study, five women or 10 percent of CES directors, served as the chief executive officer (CEO) of a state-based Cooperative Extension System in the fifty 1862 land-grant universities and none in 1890 institutions. Three women served as Associate Directors with responsibility for day-to-day operations of CES.

As women assume positions of leadership in the public realm they are bringing their values with them (Helgesen, 1990). Just as individuals are enriched by developing both the masculine and feminine sides of the self (independence and nurturance, intellect and intuition), so society is benefiting from the change in the balance of power between the sexes (Ferguson, 1984).

The National Extension Leadership Development (NELD) program promotes a "new" leadership philosophy called "next-age leadership" (Apps, 1990). "Next-age leadership" describes an administrator who will function much more cooperatively, both within and outside a particular organization. "Next-age leadership" builds on the leadership skills and theories that have developed over the years, but is different in that it is not gender-specific.

If the concept of leadership is redefined as Apps envisions, we can think differently about women in leadership roles. Burns (1978) called it "male bias" that sees leadership as mere command or control, whereas it is properly the engagement and mobilization of human aspirations. Women are learning to use their unique leadership qualities--integration, empathy, reconciliation, intuition--openly, rather than the coy and manipulative ways of the past (Ferguson, 1984).

The theory that there is a style of leadership particular to women gained widespread attention in a 1990 article in the Harvard Business Review by Judy Rosener. Entitled "Ways Women Lead," the piece argued that women are more likely than men to manage in an interactive style--encouraging participation, sharing power and information, and enhancing the self-worth of others. Rosener claimed that women tend to use "transformational" leadership, motivating others by transforming their self-interest into the goals of the organization, while men use "transactional" leadership, doling out rewards for good work and punishment for bad. Bass (1985), who studied subordinates of both men and women managers, also found that women bosses were more often described as possessing transformational leadership qualities.

Feminine leadership is a style of managing that utilizes the full range of women's natural talents and abilities. It is an approach that is linked to gender differences, early socialization, and the unique set of life experiences from early childhood on, which shape women's values, interests, and behaviors as adults. The feminine leadership style is composed of many qualities and characteristics that are different from those used by men. Yet, taken together, these qualities represent a leadership style that works extremely well for many women--better, in fact, than the more traditional approach. Figure 1 summarized the key differences between the leadership styles of men and women in management.

Purpose and Objectives

The purpose of this study was to explore and describe the aspirations, values, motives and actions of women currently serving as CEOs for state-based Cooperative Extension Systems. This inquiry was meant to provide initial observations regarding women in senior-level leadership roles related to their leadership attitudes, strategies and theory; how they make decisions, communicate, manage resources and build relationships; and their personal experiences as women, daughters, sisters, wives, mothers, friends and executives. Through the discovery of strengths and the understanding of limitations within this select pioneer population, future generations of women who aspire to CES leadership roles can learn and benefit. Specifically, the research objective of this study was to identify factors relating to women successfully shattering the glass ceiling within state-based Cooperative Extension Systems.

Procedures

Postpositivism recognizes the constructed nature of reality rather than positing the existence of only one truth. Knowledge of context becomes important as scholars understand how critical contextual variations can be. Reality is constructed, multiple, holistic and divergent. The goal is to interpret and understand the reality of the participants emerging from the data.

The research base on women's ways of leadership is not yet robust enough to offer theoretical generalizations that have wide support. Because the theoretical constructs are so limited, the in-depth case study research design, well grounded in the postpositivistic paradigm, was chosen because of its capacity to generate rich, subjective data (Patton, 1990). An interpretative type of inquiry was chosen for its contextual approach to understanding, helping to more clearly describe the subtleties that may exist in the phenomena under investigation (Nord & Tucker, 1987).

Yin (1989) states that a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context and in

	Leadership Model	
Characteristics	**Masculine**	**Feminine**
Style	Transactional	Transformational
Structure	Hierarchy	"Webs of Contacts"
Objective	Winning	Production Emphasis . . . Excellence Orientation
Value	Vision	Voice
Decision Making Style	Militaristic	Consensus-Building
Key Descriptors	Competitive Unemotional Exclusive Isolated Control	Cooperative Empathic Inclusive Integrated Empower

Figure 1.
Key Differences Between Males and Females in Management

which multiple sources of evidence are used. Case studies allow an investigator to retain the holistic and meaningful characteristics of real-life events, such as organizational and managerial processes. Guba and Lincoln (1989) suggest that it is through the process of the understanding of the events in the case that the reader can see whether or not the knowledge in the case can be applied in a second setting. In the multiple case study, observing processes and outcomes across several sites adds to the understanding of how contextual variations may affect the emerging theory.

Frame, selection and sampling error are not applicable in the postpositivist paradigm. Utility and credibility of a small purposeful sample support the paradigm's logic and purpose, more so than probability sampling. Transferability is the goal, not representativeness for generalizing from the sample to the population.

The target population was all women serving as senior-level administrators of state-based Cooperative Extension Systems. No individual with an interim assignment was included in the target population. Although job titles varied, job responsibilities were consistent, with the identified CEOs having primary leadership for CES management and operations. At the time of the study, eight women served as Extension senior-level administrators (Directors and Associate Directors). A census study was conducted.

The development of data credibility checks to protect research and theory construction is essential in the efforts to establish trustworthiness within the postpositivist paradigm. In most traditional research, investigators attend to issues of internal and external validity, objectivity, and reliability. Lincoln and Guba (1985) draw parallels for each of these methodological issues and label them credibility, transferability, confirmability, and dependability.

Credibility is the extent to which the findings are consistent with the participants' views of constructed reality. Procedures to increase the likelihood of producing credible findings for this study included: prolonged engagement, triangulation, peer debriefing, and member checks.

Transferability is actually claimed by the readers of the study rather than the writer of the study. The writer supplies the data in context (thick description) and the reader concludes whether or not to contemplate a possible transfer. Transferability is possible when collection methods result in a rich data base, thick in description and detail. The data must capture not only the details but also the nuances, drawing a concrete, empirically based picture for the reader.

Confirmability is the process of assuring that data, interpretations, and outcomes of inquiries are grounded in contexts and persons apart from the evaluator. Three techniques were used to establish confirmability: triangulation of multiple data collection methods and multiple sources, data archieved to specifically assess the source of records and sources of data, and reflexive journal chronologically tracked the events and insights that occurred during the process of data collection and analysis.

The overall record-keeping serves as a source of dependability for postpositivist research. Detailed records of this study were kept in the form of field notes, transcripts, a reflexive journal, computerized coding, and records of various state of data analysis.

A triangulation of qualitative data collection methods and data sources was utilized to assess what these women attribute to their success in shattering the glass ceiling. It is essential that methodology seek counterpatterns as well as convergences if data are to be credible. The four data collection methods used in this study were five working days of structured observation; a personal interview; a biographic data survey; and member checks using open-ended questions.

Questions framed for the interview and biographical data survey were pretested with a convenience sample of 39 female graduates of the first CES sponsored executive development institute. The returned suggestions and comments were reviewed and analyzed; revisions and additions were made before field testing the instruments.

Face and content validity of the final instrument and methodology was determined through a sample of five female mid-level administrators of Ohio State University Extension. The participants were asked for feedback on the instruments' content and format immediately following the field test. Data were also reviewed for potential problems. Final revisions and editing were based on this information.

The researcher observed each study participant for five working days. Each observed event (a verbal contact or a piece of incoming or outgoing mail) was categorized by the researcher in a number of ways (for example: duration, participants, purpose). In addition to categorizing events, the researcher was able to record detailed information on important incidents and to collect anecdotal materials. A concluding interview, utilizing an interview guide, was used to increase the comprehensiveness of the data. All interviews were audio-recorded, transcribed and analyzed using The Ethnograph computer program. A biographical data survey was given to each participant to verify demographic and personal characteristics.

Analysis of Data

The data were analyzed inductively, and two essential subprocesses were involved, unitizing and categorizing. Unitizing involved a process of coding in which the raw data were systematically transformed and aggregated into units which permitted precise description of relevant content characteristics. Categorizing sorted the units into provisional categories. For example: After an initial reading, all data referring to early development was so coded or unitized. Then all the units coded for early development were sorted into categories such as relationship with father, relationship with mother, relationship with siblings, etc. The data were initially coded and categorized without the input of the participants.

Face validity in postpositivist inquiry is dependent on member checks, where emergent categories and conclusions are recycled back through respondents and refined in light of the participants' reactions. Two formal member checks were conducted.

Each participant was sent a first cut analysis of the data and asked for their careful review and reflection. A telephone conference was scheduled to discuss the initial findings and the participants' perceptions. Through this process, the data were expanded and enriched.

As a result of this first member check, the data and original analysis were reviewed, the categories narrowed and an analytical reading was developed. The reading was sent to the participants with an open-ended questionnaire for recording reaction to the monograph. The participants' comments regarding the reading guided the writing of the final analysis and conclusions. The step-by-step approach begins with a wide range of possibilities and ends with a clearly defined extraction of the constructed reality of the participants.

Results

To place the eight women together in a room would quickly highlight the differences in the individuals; each has developed her own unique, individual style. However, in analyzing how these pioneers go about accomplishing their work, more similarities than differences are found.

Every detail of the reported results may not hold for every person, yet the patterns found in the analysis and reported here are solid. For an emerging theme to be reported, six of the eight participants voiced the idea during the interviews or four of the five participants who were observed exhibited the behavior. All participants did not need to express exhibit the emerging behavior or idea at the same level of intensity for the theme to be included; however, an attempt was made to provide the contextual variance and richness through the words of the participants.

The text represents a blending of findings from both the observations and interviews. Wherever possible, self reported information

was confirmed with observation data. Quotes were used to illustrate those findings. The member checks were used to place the participants in a position of central importance and to represent their reality through the use of their own language and interpretation.

Characteristics of the Participants

The average age was 50.5, ranging in age from 40 to 60. All but two became CEOs during their early to mid-forties, with 43.5 being the average age for the group (range 38-52). At the time of the interview, two participants had never married, one was divorced, and five were married. Of the six who married, three had children still living at home and three ware married without children.

There was a particularly strong and regular pattern to the family histories of the participants. Regardless of birth order, all participants described a childhood detailing behavioral dynamics which underline the early experiences of a first born child. The women recalled their parents supported and reinforced the child in developing her own qualities and capacities, never forcing the child into stereotypical gender roles. There existed a very special relationship between the young girls and their fathers, sharing interests and activities traditionally regarded as appropriate for fathers and sons. In general, their mothers were remembered as warm and caring feminine models; strong women, who because of the social norms of the time, did not achieve all their dreams.

Although all eight remembered their childhoods as having been happy, each had sustained a courage-building experience in her childhood, and early gained an awareness of and faith in her own power. Self reliance was a highly prized value and, today, is perceived by others as a gritty, pioneer spirit. Without exception, each individual knows her "self" well. These women administrators are comfortable with "self" and confident in the abilities of "self." All had a presence projecting strength and confidence when entering a room.

Women as Executives

The eight female participants shared common capabilities and strengths for leading complex, diverse organizations. Five broadly defined themes emerged from the data supporting common values, motives and actions. The five emanated themes include: work environment, leadership style, conflict management. communication, and decision making.

Work Environment

Participants:

* understood that fast-changing environments play havoc with tradition, creating opportunities for women.
* desired and actively sought high contact with people; office hours were reserved for people and paper work became homework.
* exhibited strong commitment to social justice; became administrators to be of service to people.

Leadership Style

Participants:

* preferred interactive leadership; however, were comfortable using a variety of leadership styles as situation required.
* shared power and information willingly with others; cultivated internal and external partners.
* had ability to excite others about their work, but more than cheerleaders; made a difference for individuals by articulating the vision, creating a positive work environment, and empowering others.

Conflict Management

Participants:

* practiced collaborative and compromising strategies to be most effective; truly worked for win-win situation.
* were not afraid to battle for good of organization and its people.

* withdrew from conflict until timing was right; however, continued to be active.....thinking, planning, evaluating to prepare the best strategy.

Communication

Participants:

* spend 70 percent of work time communicating.

* valued and practiced a flattened hierarchy; operated in "webs of contacts" rather than from pyramid-shaped flow charts.

* used language that encouraged participation and community building.

Decision Making

Participants:

* possessed holistic orientation; able to see big picture and how one decision impacts the parts of the whole.

* preferred collegial decision making style; more inclusive than exclusive.

* used long-range planning, formative and summative data in making decisions.

The Path to the Top

Although academic training and work histories varied greatly among the participants, future generations of women who aspire to CES leadership roles can benefit from what these pioneers learned along the path to the top. Like any journey, the one that started the women on the path to the top began with preparation. Without the required credentials and competencies, the aspiring leaders could not take advantage of the opportunities along the way. A network of contacts helped in identifying those opportunities, and mentors, through teaching, coaching and guiding, assisted in gaining knowledge and skills for upward mobility. Finally, time invested wisely, energy expended to achieve results, and passion for the work to be done were necessary for a successful trip.

Conclusions and Recommendations

Based on the review of literature and the findings related to the research objectives, factors ware identified that relate to women successfully shattering the glass ceiling within Cooperative Extension Systems. The following conclusions, applicable to the population of this study, were reached:

(1) The senior-level administrators participating in this study shared an underlying philosophy: leadership is about inspiration and influence, not enforcing power.

(2) These women who shattered the glass ceiling are not imitations of men. Each has develop her own unique, individual style; however, in analyzing how these pioneers go about accomplishing their work, more similarities than differences were found.

(3) The CEOs don't focus on gender as an issue; they get on with the job.

(4) The individual knows "self" well. Each woman appeared comfortable with "self" and confident in abilities of "self."

(5) Drawing on what was unique to their socialization as women (understanding, cooperative, supportive, service orientation), the participants created individualized paths to the top. Their competencies and credentials were of the highest quality, and they took or made opportunities to prove their abilities.

(6) These leaders valued and practiced a flattened hierarchy, operating in "webs of contacts" rather than form pyramid-shaped flow chart.

(7) Viewing communication as an important step in achieving the organization's mission, the CEOs made sure information flowed freely to all internal and external partners.

(8) The participants preferred an interactive leadership style; however, they were comfortable using a variety of leadership styles as the situation required.

(9) The women did seek input from a variety of sources, both internal and external, but can and did make the tough decisions when the situation demanded.

(10) The leaders kept the long term goals and vision of the organization in constant focus throughout the decision making process.

(11) The female executives believe in building partnerships (internal and external) to achieve the organization's mission.

(12) The women serving as CEOs of Cooperative Extension Systems ascribed their power to personal characteristics, like charisma, interpersonal skills, hard work, knowledge or personal contacts, rather than to organizational stature, like position and formal authority.

Recommendations

The review of literature, the findings of this study, and the subsequent conclusions and implications led this researcher to several recommendations for Cooperative Extension Systems, for further study, and for female administrative aspirants. Following are these recommendations:

Recommendations for Cooperative Extension Systems

(1) It is recommended that Cooperative Extension Systems take action to promote a quality, inclusive and diverse leadership for meeting the challenge of change within the organization.

(2) It is recommended that CES continue to involve equal numbers of women in developmental practices and credential building experiences, including advanced education and career enhancing assignments such as national, regional and state committees and task forces and special projects, that have been traditional precursors to advancement.

(3) It is recommended that CES identify "high potential" employees early in their careers and oversee their career advancement through yearly appraisals and needs assessments. Individualized professional development programs are key to enhance academic and work-related credentials.

(4) It is recommended that monitoring for equal access and opportunity, especially as female managers of local units move up the organizational ladder to mid-level administrative positions where important decisions are made, is considered an organizational responsibility or part of the planning for developmental programs and policies.

(5) It is recommended that females currently serving as mid- and senior-level administrators seek and develop a mentoring relationship with potential women employees who aspire to CES leadership roles.

(6) It is recommended that accountability for Equal Employment Opportunity responsibilities be placed with senior-level administrators and top university decision makers.

(7) It is recommended that CES establish educational opportunities for both internal and external partners in order to promote and applaud diversity and redefined leadership. Meaningful incentive programs must be developed to recognize efforts to promote equal opportunity.

(8) It is recommended that as mid- and senior-level leadership positions become available careful evaluation be give to the competencies and credentials announced as required to do the job effectively.

Recommendations for Further Study

(1) It is recommended that this study be replicated with a sample of male CES senior-level administrators to determine differences or similarities. Does a "Female Organizational Culture" exist? Or are the leadership attitudes, strategies and principles identified in this female population common among CES executives regardless of gender?

(2) Should the data support the existence of a "Female Organizational Culture," further qualitative and quantitative research would be necessary to establish theoretical formulation.

(3) Further qualitative and quantitative research is needed to determine what impact the aspirations, values, motives and actions of female senior-level administrators has on a state-based Cooperative Extension System.

(4) Using these initial observations as a framework, future qualitative and quantitative research could provide an assessment technique for determining organizational readiness for women to serve in senior-level administrative positions.

(5) Further qualitative and quantitative study is needed to formulate a model for a professional development strategy preparing women for senior-level leadership roles within CES.

Recommendations for Female Administrative Aspirants

(1) It is recommended that females aspiring to administrative roles within CES achieve credentials and competencies in basic leadership skills, such as communication, negotiation, interpersonal, and strategic planning. Academic preparation is a prerequisite for senior-level leadership roles; attain the degree requirements in an area of study that will assist in preparing the individual for administrative responsibility.

(2) It is recommended that female aspirants seek opportunities to participate in developmental programs and credential building experiences, including advanced education and career enhancing assignments such as national, regional and state committees and task forces and special projects, that have been traditional precursors to advancement.

(3) It is recommended that females seek and develop significant relationships with a variety of individuals who can teach, coach and guide the emerging leader in preparation for upward mobility. Each mentor can offer a different perspective or a new skill to add to the aspiring administrator's competencies.

(4) It is recommended that emerging leaders build a network of support among colleagues and peers. Effective networks are developed and maintained in a climate of trust and equality.

(5) It is recommended that aspiring leaders thoroughly understand the demands of a senior-level administrative position. Huge investments of time, energy, and passion are necessary to do the job.

(6) It is recommended that females aspiring to leadership roles become comfortable with "self" and confident in abilities of "self." Each leader must develop her own unique, individual style; not become an imitation of someone else.

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WOMEN WHO SHATTERED THE GLASS CEILING: CASE STUDIES OF THE ASPIRATIONS, VALUES, MOTIVES AND ACTIONS OF WOMEN SERVING AS ADMINISTRATORS FOR COOPERATIVE EXTENSION SYSTEMS.

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Significance of the study

This study clearly addresses one of the most current issues of the day, women as administrators. The issue has implications far beyond extension administration. The title for this study is enough to cause one to want to immediately examine the results and conclusions sections. The researchers are to be commended for conducting a study that has to provide significant insights into a very perplexing issue.

Methodology

The literature review gave clear direction in framing the study. The procedures outlined clearly fit the nature of the problem. The justification and parameters of case study methodology were addressed in the paper. The researchers are to be commended for outlining each step and appeared to address every issue one might want to raise regarding its process they followed. What does not seem perfectly clear to this reviewer is where the target population was located. One must piece together several statements to find there were eight participants and one must assume they were located across the United States. It was never directly stated but one must assume the study contains eight cases focused on CEO's who served as Extension senior level administrators. Three techniques were used to provide confirmability of the data collected and external validity. The internal validity dimension seems to be addressed in the one week observational period and careful development of the instruments. Consequently, the data analyses and results sections yield an interesting insight into eight women who shattered the glass ceiling.

Conclusions and recommendations

The conclusions and recommendations all appear appropriate in light of the paper. Although it may be totally misinterpreted on the part of this reviewer, the first conclusion suggested that leadership is inspiration and influence, not enforcing power. However, in the findings it was pointed out that each participant was aware of and had faith in her power.

The conclusions are informative and clearly presented. The suggestion that a study be replicated with male Cooperative Extension senior level administrators to determine differences would be an interesting and meaningful comparison. In summary, this study was well designed and provides valuable insights into a critical issue. This area should yield a series of studies for the researchers.

INTEGRATION OF MATHEMATICS INTO AGRICULTURE CURRICULUM: ARE TEACHERS READY?

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Introduction

> If we want teachers of vocational agriculture to aid in dismantling the barriers separating general education from vocational education, we must equip present and prospective teachers with skills that enable them to see how English, mathematics, science, and other so-called academic courses are relevant to their interest and goals (Warmbrod, 1974, p. 10).

Warmbrod's statement preceded an ever growing emphasis for change in vocational education. Over the last decade, several reformers have made consistent recommendations regarding vocational education. Some of these recommendations include: (1) the role of vocational education is to make youth employable, (2) employability can be accomplished when vocational education complements academic education, (3) academic and vocational education curricula should be integrated and their coequal importance recognized, and (4) students should see a connection between the academic skills they are required to learn and the world of work in which they will be required to apply those skills (Educational Testing Service, 1991; National Commission on Secondary Vocational Education, 1984; The Secretary's Commission on Achieving Necessary skills, 1991; Wade & Williams, 1988; William T. Grant Foundation Commission on Work, Family, and Citizenship, 1988).

Vocational educators recognize the importance of academic proficiency to vocational students but are increasingly concerned that vocational students are not capable of transferring their academics skills to applied settings. Taba (1962) recognized that knowledge was not automatically transferred. Taba wrote that transfer "takes place only if there is some aid both in abstracting and applying the principle and in developing the method and the 'set' for so doing. This involves organizing the curriculum so that the principles of a subject stand out" (p. 125).

Most of the effort toward integrating academic and vocational education has come from vocational educators. Why is this so? Gray (1991) contended that without debate and reform, vocational education may cease to exist. From a more positive perspective, Pritz (1988) observed that employers expect their employees to apply basic math, science, communication, problem-solving, and decision making skills to specific tasks.

Should agricultural educators be concerned with integrating academic concepts into the curriculum and instruction of agricultural education. Buriak and Shinn (1991) developed an agenda for research in agricultural education which included the teaching of basic and academic skills as a research activity. Integration of basic and academic skills and infusion of science and mathematics into agricultural education were research objectives. Johnson (1991) provided support for studying the application of academic skills to agriculture. Johnson found that years in math and grade in math were highly related to success in the Mississippi agricultural mechanics contest and suggested that it may be necessary to design instructional programs to improve the mathematical problem-solving ability of agriculture students.

If the integration of academic material into agriculture curricula is important, what are the current attitudes of teachers? Teachers will ultimately determine whether or not integration takes place. Also, what measures are currently being taken to integrate mathematics into the agriculture curriculum?

Purpose and Objectives

The primary purpose of this descriptive study was to describe agriculture teachers attitudes toward including mathematics concepts in the curriculum and instruction of agricultural education. The study further sought to describe efforts that were currently underway to integrate mathematics into the curriculum and instruction of agricultural education. The objectives were to:

1. Describe agriculture teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education.
2. Determine whether or not agriculture teachers' programs were actively engaged in applied academics (mathematics) as defined by the Ohio Department of Education, Division of Vocational and Career Education.
3. Determine whether or not agriculture teachers work with mathematics teacners for the purpose of correlating mathematics and agriculture instruction in their respective schools.
4. Describe relationships between agriculture teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education and selected personalogical variables.

Procedures

Population and Sample

The population consisted of all production agriculture teachers in Ohio (N=281). The Ohio Directory of Agricultural Education was used to develop a list of all production agriculture programs (N=255). Teachers from each program were invited to attend one of four sprayer calibration workshops held in different locations around the state. Data for this study were collected during the workshops. Teachers from 34 programs participated in the study for a 13.3% program participation rate and a 9% teacher participation rate.

Teachers who participated in the study were compared to representative samples of non-participants to determine if participants were similar to the population on background characteristics. Comparisons were made on the following characteristics; age, years of teaching experience, number of college mathematics courses completed, highest level of college mathematics coursework completed, ACT math score, and final college GPA. Only one significant difference was found. Participants had significantly higher final college GPA's than non-participants. Participants were similar to the population on background characteristics, however, extreme caution should be exercised in generalizing the results beyond the teachers studied.

Instrumentation

The attitudinal instrument was developed by the researchers. The instrument was composed of 15 Likert type items with response categories ranging from strongly disagree (1) to strongly agree (5).

Content and face validity were assessed by a panel of experts consisting of faculty and graduate students in the Agricultural Education Department. The instrument was field tested with a group of 18 secondary agriculture teachers not included in the sample. Cronbach's Alpha was used to assess the reliability of the instrument and yielded a coefficient of .87.

Data Collection

Questionnaires were administered to teachers during each of four research study/sprayer calibration workshops conducted by the researchers. Background information was obtained from state teacher certification files and college of agriculture records.

Analysis of Data

The data were analyzed using the SPSS/PC+ statistical package. Appropriate statistical procedures were utilized for description (frequencies, percents, means, standard deviations, and Pearson correlations). The alpha level was set a priori at .05, and Davis' (1971) descriptors were used to interpret all correlation coefficients.

Results

On a five point scale, agriculture teachers attitude scores ranged from 3.67 to 5.00. Table 1 shows that 44.6% (15) of the teachers provided attitude scores greater than 4.50. The distribution of attitude scores was negatively skewed with a mean of 4.47 and a standard deviation of .35 (Table 1).

Table 1

Agriculture Teachers' Attitude Toward Including Mathematics in the Curriculum and Instruction of Agricultural Education

Attitude Score	Frequency	Percent	Cum. %
3.51-3.75	1	2.9	2.9
3.76-4.00	4	11.8	14.7
4.01-4.25	2	5.9	20.6
4.26-4.50	12	35.3	55.9
4.51-4.75	4	11.8	67.6
4.76-5.00	11	32.3	100.0
Total	34	100.0	

Mean = 4.47 Std. Dev. = .35

Note. Based on scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree.

In order to better understand agriculture teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education, the level of agreement with each item on the attitude scale was examined. In response to positively worded items, teachers provided mean scores greater than 4.50 on the following statements; (1) students must understand basic mathematics to be successful with certain agricultural topics, (2) students learn more when they see a relationship between subjects (i.e. math and agriculture), (3) agriculture teachers should reinforce math skills, (4) agriculture courses provide an excellent vehicle for reinforcing math skills, (5) applying mathematics concepts to agriculture promotes higher level thinking in students (Table 2).

In order to facilitate interpretation and understanding, negatively worded items were reverse coded. Teachers provided mean scores greater than 4.50 on the following negatively worded items; (1) I refuse to teach applied math skills to agriculture students, and (2) I advise my students to avoid mathematics (Table 2).

In response to state and federal legislation calling for the integration of vocational and academic education, the Ohio Department of Education, Division of Vocational and Career Education (1991) developed several applied academics programs. Ohio's applied academics programs operate on the premise that certified academic instructors are best qualified to teach the academic components of vocational programs. For example, an applied academics (mathematics) program would require a certified mathematics teacher to provide math instruction that is correlated with the instruction received by students enrolled in vocational agriculture. According to the Action Plan for Accelerating the Modernization of Vocational Education in Ohio: Ohio's Future at Work

(1990), applied academics (science, mathematics, and English/language arts) will be implemented in all secondary occupational programs by 1994.

Table 2

Means and Standard Deviations for Individual Items on the Attitude Scale

1.	Students must understand basic mathematics to be successful with certain agricultural topics.	4.79	.41
2.	I refuse to teach applied math skills to agriculture students.	4.76	.50
3.	Students learn more when they can see a relationship between subjects (i.e. math and agriculture).	4.74	.45
4.	I advise my students to avoid mathematics.	4.71	.46
5.	Agriculture teachers should reinforce math skills.	4.65	.49
6.	Agriculture courses provide an excellent vehicle for reinforcing math skills.	4.65	.49
7.	Applying mathematics concepts to agriculture promotes higher level thinking in students.	4.50	.51
8.	Teaching applied math to agriculture students is a good idea.	4.47	.51
9.	I enjoy using mathematics to solve agriculture related problems.	4.44	.56
10.	If more instructional materials for teaching mathematics applications in agriculture were available, I would not use them.	4.44	.75
11.	In general I favor including mathematics concepts in the curriculum and instruction of agricultural education.	4.44	.56
12.	Students learn more when they are taught mathematics exclusively by a mathematics teacher.	4.26	.83
13.	The Ohio Department of Education should develop instructional materials which address math applications in agriculture.	4.21	1.01
14.	Undergraduates in agricultural education should take only one college level course in mathematics.	3.97	.94
15.	Vocational students need less instruction in math than those preparing to attend college.	3.94	.78

Slightly more than 45% (15) of the agriculture teachers indicated that their programs were engaged in applied academics (mathematics) (Table 2). In order to determine the accuracy of the information, state vocational education documents were examined. These documents revealed that only 6% (2) of the programs represented in the study were engaged in applied academics (mathematics).

Table 3

Agriculture Programs Engaged in Applied Academics (Reported by Teachers)

Engaged in applied academics	Frequency	Percent
Yes	15	45.5
No	18	54.5
Total	33	100.0

Agriculture teachers were asked to indicate whether on not mathematics teachers asked them for examples of agriculture related mathematics problems to be used as part of the regular instructional program in mathematics. Table 3 shows that 26.5 % (9) of the agriculture

teachers indicated that mathematics teachers did ask them for examples of agriculture related mathematics problems.

Table 4

Mathematics Teachers Ask Agriculture Teachers for Examples of Agricultural Related Mathematics Problems

Math teachers ask for examples	Frequency	Percent
Yes	9	26.5
No	25	73.5
Total	34	100.0

Agriculture teachers were asked to indicate whether or not they consult with mathematics teachers regarding ways to incorporate mathematics skills into the agriculture instructional program. Table 4 shows that 47.1% (16) of the teachers did consult with mathematics teachers regarding ways to incorporate mathematics skills into the agriculture program.

Table 5

Agriculture Teachers Consult With Mathematics Teachers Regarding Ways to Incorporate Math Skills into the Agriculture Program

Agriculture teachers consult	Frequency	Percent
Yes	16	47.1
No	18	52.9
Total	34	100.0

Pearson correlations were calculated to describe relationships between selected personalogical variables and agriculture teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education. The relationships between teachers' attitude and the number of college mathematics courses completed and final college grade point average were negligible. Low positive associations were found between teachers' attitude and age, years of teaching experience, and ACT math score. None of the relationships between agriculture teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education and the selected personalogical variables were statistically significant (Table 6).

Table 6

Variable	X1 n=34	X2 n=34	X3 n=30	X4 n=11	X5 n=30	Y1 n=34	Mean	S.D.
Age (X1)	1.00	.79*	-.12	.26	-.06	.15	38.24	8.86
Years Experience (X2)		1.00	-.02	.23	.07	.14	12.71	7.55
No. Math Courses (X3)			1.00	-.27	-.25	-.01	2.47	1.33
ACT Math Score (X4)				1.00	.04	.17	24.27	3.95
Final GPA (X5)					1.00	-.06	2.77	.39
Attitude (Y1)						1.00	4.47	.35

* $p < .05$

Conclusions and/or Recommendations

All of the agriculture teachers participating in the study held positive to strongly positive attitudes toward including mathematics concepts in the curriculum and instruction of agricultural education. Similarly, Miller and Vogelzang (1983) found that vocational agriculture teachers in Iowa supported the inclusion of mathematics concepts in agricultural education. An analysis of responses to individual items on the attitude scale revealed that agriculture teachers believe that the integration of mathematics into agriculture curricula would provide both vocational and academic benefits to students. The findings of this study lend additional support to a growing consensus among vocational education leaders and educational reformers who encourage the integration of vocational and academic education.

The finding that 46% of the teachers' programs were engaged in applied academics (mathematics) was not supported by state vocational education documents. It was concluded that agriculture teachers were not familiar with Ohio's applied academics programs. Administrators in the state office for vocational and career education should be alerted that 40% of the agriculture teachers in the study incorrectly indicated that their programs were engaged in applied academics (mathematics).

Approximately 27% of the agriculture teachers indicated that mathematics teachers asked them for examples of agricultural related mathematics problems to be used as part of the regular mathematics instructional program. Additionally, 47% of the agriculture teachers indicated that they consulted with mathematics teachers regarding ways to incorporate mathematics skills into the agriculture instructional program. It was concluded that some efforts were being made at the local level to correlate agriculture and mathematics instruction. Recently, Dormody (1992) found that a majority of agriculture and science teachers were sharing resources. Dormody's findings as well as the findings of the current study "do not support a rhetorical hypothesis, common in agricultural education, that secondary school teachers of agriculture are not interacting with other programs at their schools" (p. 29). Teacher educators should encourage present and prospective agriculture teachers to work collaboratively with mathematics teachers and teachers of other academic courses. Collaboration should focus on successful integration of vocational and academic education. Such collaboration will aid in closing the gap that often exists between vocational and academic programs.

Relationships between teachers' attitude toward including mathematics concepts in the curriculum and instruction of agricultural education and selected personalogical variables ranged in magnitude from negligible to low and none were statistically significant. It was concluded that the relatively low and non-significant correlations were, in part, a function of the consistently positive attitude scores provided by the agriculture teachers.

The notion that mathematics concepts should be integrated into the secondary agriculture curriculum has considerable support. The question that remains is how can this be done most effectively? Applied academics has reached very few agriculture programs, and approximately half of the agriculture teachers studied were not collaborating with mathematics teachers. It would be reasonable to suggest that agriculture teachers should be able to demonstrate the application of mathematics to agriculture related problems. Agriculture teachers should not become mathematics teachers, but when appropriate they should be prepared to teach their students how to apply mathematics to agriculture related problems. Are current and prospective teachers prepared to engage in such an activity? Can agriculture teachers solve basic agriculture related mathematics problems? Research is needed to determine whether or not teachers of agriculture are capable of applying mathematics to agriculture related problems and to identify factors that are predictive of this ability.

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INTEGRATION OF MATHEMATICS INTO AGRICULTURE CURRICULUM ARE TEACHERS READY?

Alan A. Kahler, Iowa State University -- Discussant

The integration of basic skills instruction into secondary agriculture curricula has been of concern to agricultural educators for over a decade. It is refreshing to see these educators recognizing their role in enhancing instruction on basic skills as a part of their instructional responsibilities.

The authors have addressed an important aspect of the infusion of mathematics instruction into the agriculture curriculum. "Are teachers ready to integrate instruction on mathematical concepts into their instructional programs." The paper is generally clear and well written and provides interesting information about the attitudes of teachers toward integrating instruction in mathematics in their programs. Objectives are clearly stated and the reporting of findings is organized around the objectives.

Procedures that were used to satisfy the objectives were described in enough detail to understand, generally, how the study was conducted. I had several questions that would have added to a better understanding of subsequent sections of the paper. What was your true population? Was it all Ohio teachers or was it those teachers who participated in the workshops? Why and how did you select the "personalized" items? Was there literature to support their use in this study? How did you select the nonparticipants and how did you collect the desired information from them?

I had difficulty in the use of a Likert-type scale to measure attitudes applying agree-disagree descriptors to the scale values with the mid-point scale value being "neutral." In essence, you are establishing a two-way scale with the descriptor values on both scales being equal. "Strongly disagree" (scale value=1) is equal to "Strongly agree" (scale value=5) yet your scale values suggest that strongly agree is higher than strongly disagree.

I had a concern with the Conclusions and Recommendations section of the paper. My concern focused primarily on the inferences drawn and whether the data in the study supported these inferences. While you cautioned about generalizing the results because, I presume, of the limited number of teachers participating in the study, I got the strong feeling that you are proposing that these data be used as a basis for several statewide initiatives to integrate math instruction in agriculture programs.

STUDENT AND TEACHER ATTITUDE TOWARD AND PERFORMANCE IN AN INTEGRATED SCIENCE/AGRICULTURE COURSE

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Introduction

The mission of agricultural education was broadened to include career preparation in agriculture other than production as a result of the 1963 Vocational Education Act (U.S. Congress, 1963). Agricultural education is again moving toward a broader mission. According to the National Research Council (1988), agriculture is too important a subject to be taught to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies. The majority of American children are entering school knowing little about agriculture and leaving after high school graduation only slightly better informed (National Research Council, 1988). Yet few systematic educational efforts are being made to teach or otherwise develop agricultural literacy in students of any age (National Research Council, 1988).

With the launch of Sputnik I, science became a major element in middle grade curricula (Becker, 1990). Both the content which is taught in science and the methods used to teach science are highly variable. By the third grade half of all students do not want to take additional science courses (Barrett, Cowley, Hager, Springen, 1990).

Research on teaching practices used in elementary and secondary schools shows an overwhelming emphasis on the basic skills and student memorization of facts (Goodlad, 1984). Educators find themselves in trouble when they forget that the best way for students to learn science is to have them do science (Barret, Begely, Hager, Joseph, Springen, 1990). Science is simply a way of looking at the world. Science involves asking questions, proposing answers, and testing them against the available evidence (Fort, 1990).

Teachers should emphasize concrete, sensual aspects of science using a "hands-on" method of teaching (Fort, 1990). The teaching of hands-on science is the process of uncovering rather than covering (Watson & Konicek, 1990).

The study of agriculture offers many opportunities to teach hands-on science. By referring to examples from the real world, teachers can capture and hold student interest in science (National Research Council, 1988). Teaching science through agriculture could enable teachers to more effectively teach science, while incorporating more agriculture into the curriculum (National Research Council, 1988).

Purpose and Objectives

The primary purpose of the study was to determine student and teacher attitude toward and performance in the newly implemented Biological Science Applications in Agriculture (BSAA) course. The evaluation provided formative feedback to persons involved in the BSAA implementation project in order that adjustments and improvements in the implementation could be made. In addition, the evaluation provided summative feedback to determine the accountability of the implementation project. The specific objectives of the evaluation stated as research questions were as follows:

1. How effective were secondary agriculture instructors in managing this type of instructional method?

2. How well did students perform in this type of instructional setting?

3. Did students learn inquiry and research skills as a result of this type of instructional method?

4. How did instructors perceive their ability to manage this type of instruction and the effectiveness of this type of instruction on student gains?

5. How do students perceive the usefulness of this method?

Procedures

Biological Science Applications In Agriculture is an applied science course in agriculture designed to enhance student achievement in biology. The course develops and reinforces student understanding of science by integrating basic scientific principles and concepts with relevant applications in agriculture. Students deepen their understanding of science concepts and process through the use of 35 laboratory exercises and experiments. One year of biology is recommended as a prerequisite to enrollment.

Agriculture instructors and students involved in the field testing and implementation of the BSAA course during the 1991 spring semester were the population for this evaluation.

A purposeful sample of teachers (n=6) and their students (n=76) was drawn from the twenty-seven teachers participating in the implementation project. Evaluation sites were selected based on school size, geographic location, and the agricultural instructors willingness to participate in the evaluation.

Six instruments were developed by the researchers to collect data for each of the research questions in the study. They where Teacher Performance Evaluation Instrument, Teacher Interview Instrument, Teacher Attitude Instrument, Student Performance Evaluation Instrument, Student Interview Instrument, and Student Attitude Instrument. A panel of experts consisting of two members of the agricultural education faculty at the University of Illinois was used to determine the content validity of the instruments.

In order to gather formative data, the researchers scheduled a visit to each of the schools in the sample. During each visit the researchers observed and gathered data during a BSAA class session. In addition, student and instructor interviews were conducted by the researchers. In order to verify and validate the data, the researchers compared the data collected following each site visit in order to determine inter-observer agreement. In this case, inter-observer agreement was calculated as the average of the data collected during the two observations (Borg & Gall, 1983).

Summative instruments were mailed to the sample schools two weeks preceding the end of the spring semester. The instruments were completed by students and teachers during finals week and returned to the researchers.

Results

In order to facilitate analysis of the data and the drawing of conclusions, the specific objectives of the study were stated as research questions. In this section, the discussion of the findings are organized around those research evaluation questions. Both qualitative and quantitative analysis was conducted on the data collected.

Key Evaluation Question 1: How effective were secondary agriculture instructors in managing this type of instructional method?

Formative Evaluation: The Teacher Performance Evaluation Instrument (see Table 1) was used to gather the data needed to answer this key question. Performance was ranked on a seven point Lykert type scale with a score of seven indicating an excellent level of performance.

Overall, the data indicated an average level of teacher performance in the laboratory oriented classroom. The mean score for each of the seven teacher performance indicators ranged from 2.50 to 5.16. However, the mean score for five of the seven indicators was in the 4.00 to 4.66 range.

This average level of teacher performance indicated by the overall mean scores is somewhat misleading. A frequency distribution of the data indicate that while part of the teacher sample was performing average to below average, an equal number of teachers were performing extremely well. In general, a great deal of variation was observed in the quality of teaching exhibited by those teachers in the sample.

Key Evaluation Question 2: How well do students perform in this type of instructional setting?

Formative Evaluation: The Student Performance Evaluation Instrument (see Table 2) was used to gather the data needed to answer this key question. Performance was ranked on a seven point Lykert type scale with a score of seven indicating an excellent level of performance. Overall, the data indicated an average to below average level of student performance in the laboratory oriented classroom. The mean score for each of the seven student performance indicators ranged from 3.33 to 4.66.

This average level of student performance indicated by the overall mean scores is somewhat misleading. A frequency distribution of the data indicate that while part of the student sample was performing average to below average, an equal number of students were performing extremely well. In general, a great deal of variation was observed in the quality of performance exhibited by those students in the sample.

Closer examination of the data revealed a strong positive relationship between the seven teacher performance indicators and the seven student performance indicators. Students who received high quality laboratory instruction achieved a higher level of laboratory performance. In general, students who received below average instruction where less likely to perform well in the laboratory environment.

Key Evaluation Question 3: Did students learn inquiry and research skills as a result of this type of instructional method?

Formative Evaluation: Data gathered during the student interview indicated that the majority of students could identify the question which the experiment was attempting to answer, how they were going to attempt to answer it, the

equipment they would be using, the type of data they would be collecting, and how it would be measured. However, students were not able to identify the scientific and in most cases agricultural principles related to the activity.

Data gathered during the teacher interview indicated that students seem to be improving in their ability to perform scientific inquiry. In addition, the teachers felt that their "higher ability" students were more involved in the inquiry activities than were their "lower ability" students.

Summative Evaluation: Data collected with the Student Attitude Instrument (see Table 3) indicated that students did feel that they had learned how to perform scientific inquiry as a result of the BSAA instruction. A three point Lykert type scale was used to record student responses with a one indicating strongly agree. The mean scores indicated that students agreed that they had learned inquiry skills in the areas of designing experiments, using laboratory equipment, observing and recording data, and interpreting experiment results.

Data collected with the Teacher Attitude Instrument (see Table 4) indicated that while teachers felt their students seemed to enjoy the laboratory portions of the class, they did not seem to be grasping the concepts of scientific inquiry. The mean scores indicated that teachers felt their students did not grasp the usefulness of the ability to devise and perform experiments, found it difficult to accurately record observations from experiments, and found it difficult to accurately interpret the results of experiments.

<u>Key Evaluation Question 4: How do instructors perceive their ability to manage this type of instruction, and the effectiveness of this type of instruction on student gains?</u>

Formative Evaluation/Ability to Manage: Data gathered during the teacher interview indicated that teachers felt they were not prepared to devote the additional time required for organization, preparation and planning. Teachers felt they were learning the science principles along with the students. Teachers did expect fewer problems in the future as additional equipment and experience are obtained. Teachers with previous experience in the science classroom felt more comfortable teaching the science content than those who were emphasizing the science content for the first time.

Formative Evaluation/Student Gains: During the interview teachers indicated that students enjoyed the hands-on aspect of the course and in general participated in class activities to a greater extent than what was normally

observed. The teachers felt that students were making progress in learning how to perform scientific inquiry.

Summative Evaluation/Ability to Manage: Data collected with the Teacher Attitude Instrument indicated that teachers did enjoy teaching the BSAA course and all were looking forward to the completion of the companion courses. Teachers felt that the management time required for the class was going to limit their ability to implement it. Teachers did not find it difficult to find the equipment needed to teach the course. In addition, teachers felt they would be better able to implement the course if more background information was provided with the curriculum.

Summative Evaluation/Student Gains: Data collected with the Teacher Attitude Instrument indicated that teachers felt their students enjoyed the laboratory portions of the class but found it difficult to grasp the usefulness of the ability to devise and perform experiments. Teachers felt that their students did learn more with the type of instruction the BSAA course provided. Teachers feel strongly that their students are learning both the scientific and agricultural principles and are able to make the connections between them.

Key Evaluation Question 5: How do students perceive the usefulness of this type of instructional method?

Summative Evaluation: Data collected with the Student Attitude Instrument indicated that students did like the way the class was taught, were able to learn with the type of instruction provided by the BSAA course, felt they participated in the BSAA class more than they participated in their other classes, and would take another laboratory oriented course. Students enjoyed the scientific portions of the class and felt the ability to set up and perform experiments was useful.

Students enjoyed working with other students in the laboratory, but disliked the fact that some students did not do their share of the work in the laboratory groups. In addition the students felt their instructor was very helpful in the laboratory and knew as much about science as the science teachers they have had.

Table 1

Evaluation of Teacher BSAA Laboratory Performance

	Poor 1	2	3	4	5	6	Excellent 7
A. Teacher completes routine administrative tasks in a timely fashion.		*1*	*1*		*4*	*2*	
Comments: *Not seen performing at beginning (G, M)* *Completed (D, J, S)*			*4.62 - Mean*				
B. Teacher conducts pre-lab discussion to determine the objective of class period.	1	*3*	*1*			*4*	7
Comments: *Discussion and objectives stated (S, D)* *Discussion of procedures prio (H, G)* *Discussed proceudres while students performing (J)* *Ask question, what will happen? (M)*			*4.12 - Mean*				
C. Lab stations are properly equipped and organized.	1	*3*	3	*1*	*2*	*2*	7
Comments: *Had all materials ready (H, S)* *Class activity - one set of equipment provided (D, M, J,)*			*4.00 - Mean*				
D. Teacher rotates among groups, guiding and directing individual investigations, posing questions, and providing feedback.	1	2	3	*1*	*3*	*2*	7
Comments: *Rotates, asks, provides feedback (H, S)* *Discusses with groups what was happening (G)* *Only one group (M, D, J)*			*5.16 - Mean*				
E. Teacher gives students ample time for clean up.	1	2	3	*1*	*2*		7
Comments: *Students assisted (H, S, J)* *Did not assist (D, M, G)*			*4.66 - Mean*				
F. Teacher emphasizes and demonstrates proper safety techniques in the lab.	1	*1*	*1*				7
Comments: *Did not mention (H)* *Did not metion, water boiled over (M)* *Not applicable (remaining)*			*2.5 - Mean*				
G. Teacher conducts post-lab discussion for summary purposes.	1	*3*	3	4	*2*	*2*	7
Comments: *Did not summarize (H, G, D)* *Did summarize activities performed (S, M)* *Summarized part of activities (J)*			*4.00 - Mean*				

Delavan - D, Gridley - G, Hartsburg-Embden - H, Jerseyville - J, Manlius - M, Shelbyville - S

Table 2

Evaluation of Student BSAA Laboratory Performance

	Poor						Excellent
	1	2	3	4	5	6	7
A. Students are attentive and prepared for pre-lab discussion.			2		3	1	
Comments:			4.50 - Mean				
Students listened during discussion (H, S, G)							
Most not listening, talking (J)							
No discussion (D, M)							
B. Students seem eager to work in the laboratory.	1	2	3	4	5	6	7
Comments:		2		1	3	1	
Students went right to work (H, S, G)			4.14 - Mean				
Anticipated results, class activity (D, M)							
Three doing test, rest watching and talking (J)							
C. Students utilize laboratory time efficiently including setup and cleanup.	1	2	3	4	5	6	7
Comments:		1	1		2	1	1
Worked well, moved along to stations (activities) (H, S, G)			4.66 - Mean				
Only three of class involved (J)							
Not applicable, class activity - discussion (D, M)							
D. Each student in the group assumes responsibility for an aspect of the laboratory while working cooperatively with other members of the group.	1	2	3	4	5	6	7
Comments:		3	1		1	1	
All seemed to participate (H, S)			3.33 - Mean				
Half worked well (G)							
Three doing work, half remaining watched, half didn't (J)							
Only one group (D, M)							
E. Students correctly follow laboratory procedures as given in the BSAA manual.	1	2	3	4	5	6	7
Comments:			4		1	1	
Following procedures (D, S)			3.83 - Mean				
No procedures given (H, G, M)							
No, used directions in test kit (J)							
F. Students demonstrate safe work habits in the laboratory.	1	2	3	4	5	6	7
Comments:							
Not applicable							
G. Students seek assistance from the instructor when needed.	1	2	3	4	5	6	7
Comments:			2	1		2	
No questions (G)			4.40 - Mean				
Students asked questions (remaining)							

Delavan - D, Gridley - G, Hartsburg-Embden - H, Jerseyville - J, Manlius - M, Shelbyville - S

Table 3

Student Attitude Toward BSAA Course

Question	SA	f N	SD	x
1. I have learned:				
a. a lot about laboratory equipment in this class.	28	27	5	1.59
b. to interpret results of experiments in this class.	31	28	1	1.47
c. a lot of scientific principles in this class.	25	32	3	1.60
d. a lot of agricultural principles in this class.	29	27	3	1.50
e. a lot about observing and recording the results of experiments in this class.	33	22	5	1.50
f. a lot about the procedures necessary to perform experiments in this class.	32	21	7	1.55
g. to see the connection between scientific principles and agricultural principles in this class.	25	33	2	1.59
2. I like the way this class was taught.	35	21	4	1.45
3. I would take another laboratory oriented course.	37	13	12	1.62
4. I dislike the scientific portions of this class.	7	36	20	2.27
5. My instructor was very helpful in setting up the experiments in this class.	46	13	4	1.37
6. I did not learn very much by taking this course.	10	18	32	2.32
7. I like working with other students on laboratory projects.	33	21	7	1.57
8. The ability to set up and perform experiments is useful to many people.	32	25	2	1.44
9. I dislike the fact that some students do not do their share of work in the laboratory groups.	33	23	5	1.54
10. This class was too hard.	7	23	31	2.39
11. I like my other classes better than this class.	9	31	20	2.14
12. My agriculture teacher knew as much about science as the science teachers I have had.	25	31	5	1.67
13. I participated in this class more than I normally participate in other classes.	28	26	6	1.60
14. I would have like to have had written instructions for the experiments we conducted.	15	25	19	2.00

Table 4

Teacher Attitude Toward BSAA Course

Question	f SA	N	SD	x
1. I enjoy teaching this type of course.	1	3	0	1.75
2. The management time required for this class is going to limit my ability to implement it.	1	3	0	1.75
3. I think the students learn more with type of instruction	2	2	0	1.50
4. I feel the students are learning scientific principles in this course.	3	1	0	1.25
5. I feel the students are learning agricultural principles in this course.	3	1	0	1.25
6. I feel the students are becoming aware of the connection between scientific principles and agricultural principles.	3	1	0	1.25
7. I feel comfortable teaching the science content in this course.	1	2	1	2.00
8. There was sufficient background information provided in the curriculum materials for the experiments performed.	0	2	2	2.50
9. It is difficult to find the equipment needed to teach this course.	0	2	2	2.50
10. The students find the concepts of experiment development and performance difficult to grasp.	1	3	0	1.75
11. The students seem to enjoy the laboratory portions of this course.	3	1	0	1.25
12. I usually conduct a pre-lab and post-lab discussion.	4	0	0	1.00
13. The students seem to grasp the usefulness of the ability to devise and perform experiments.	0	3	1	2.25
14. The students are able to accurately record observations from the experiments.	1	2	1	2.00
15. The students are able to accurately interpret the results of experiments.	1	2	1	2.00
16. I found it difficult to provide the information needed by the students to perform their experiments.	2	2	0	1.50
17. I look forward to the completion of the companion courses.	4	0	0	1.00
18. I do not feel that I would have been as successful without the help of my biology partner.	1	2	1	2.00

Conclusions

1. A wide variation existed in the level of teacher effectiveness in managing this type of instructional method and in the quality of student performance in this type of instructional setting. Students who received high quality laboratory instruction achieve higher levels of laboratory instruction while students who received low quality laboratory instruction achieve lower levels of laboratory instruction.

2. Students generally enjoyed learning in this type of instructional setting and felt they participated in class activities more in this class than in other classes.

3. Students felt the ability to set up and perform experiments was useful, could answer questions about the individual experiments, equipment, and procedures, and would take another laboratory oriented course.

4. Normally students could not identify the concepts of scientific inquiry nor the scientific principles connected to the laboratory exercise they were involved in, but students did feel they had made advances during the course of the semester in their ability to perform scientific inquiry.

5. Teachers felt they were many times unprepared as a result of the extra time required to prepare for each class session. This made the teachers feel uncomfortable although they felt succeeding courses will be more easily managed due to experience and equipment availability.

6. Teachers enjoyed teaching the course, felt their students enjoyed the course and felt their students learned more in this type of instructional setting.

Recommendations

1. In order to reduce the variation which existed in the level of teacher effectiveness, agriculture instructors as well as students enrolled in teacher education programs should receive instruction in the methods and procedures of managing scientific and inquiry-based laboratory instruction.

   A. Specific laboratory management techniques.

   B. Techniques for time management.

   C. Handling student discipline in the laboratory.

D. Expected student outcomes or objectives.

2. Additional free time should be scheduled into the school day so that teachers may more thoroughly prepare for daily laboratory and instructional activities.

3. In order to foster continued incentive to learn science and scientific inquiry, more courses of this type should be developed and implemented.

4. More emphasis should be placed on the science content portion of the teachers manual.

5. Provide more subject matter content in teachers manual to save teacher time in preparing lesson plans.

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STUDENT AND TEACHER ATTITUDE TOWARD AND PERFORMANCE IN AN INTEGRATED SCIENCE/AGRICULTURE COURSE

Alan A. Kahler, Iowa State University -- Discussant

This study was well written and presented. The purpose and objectives of the study were clear and the findings were organized around the objectives. The procedures were presented in a manner that it was easy to understand how the study was conducted to satisfy the objectives.

The findings were presented in a manner that accurate conclusions could be drawn. What you were trying to say when for Objectives One and Two the data was misleading? Did you believe your results or was your bias toward the BSAA approach showing? How did you establish a "strong" positive relationship between teacher and student performance indicators? Where is evidence to support this statement in the paper?

The conclusions stated at the end of the paper were accurate and based on the results. I had trouble with the recommendations. Can you legitimately make the recommendation that teacher education programs include instruction in the methods and procedures of managing scientific and inquiry-based laboratory instruction based on the results provided by only six schools? This is especially significant when you pointed out that half of the teachers were not effective in using these methods among the six schools. Did you need this study to recommend more teacher free time to prepare for laboratory and instructional activities? What in your findings suggests more courses of this type in the curricula of other schools? It appears to me that replication of this study should have been among your recommendations.

I would be careful about recommending that agriculture become so science oriented. Others may see this as a way of expanding the science program and dropping the agriculture program from the school curriculum.

THE INFLUENCE OF AGRISCIENCE AND NATURAL RESOURCES CURRICULUM ON STUDENTS' SCIENCE ACHIEVEMENT SCORES

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Introduction

The past decade has seen many calls for education reform in the United States. Parents, teachers, and educational professionals have called for new and innovative approaches to teaching English, mathematics, and science. According to the "Nation at Risk" Report (National Commission on Excellence in Education, 1983) "There was a steady decline in science achievement scores of U.S. students" (p. 9).

The trend in science achievement scores has not improved. Former Secretary of Education William Bennett (1988) wrote that "A new assessment places American science students in rough international perspective" (p. 13). Ten year-olds placed 8th among 15 countries tested, 14 year-olds placed 14th of 17 countries. These poor science test results have increased the demand for improved science education for American students. Typically, these demands have only led to more hours added to the school day or more days added to the school year. However, the American Association for the Advancement of Science (1989), in its "Project 2061 Report: Science for All Americans" stated that, "A fundamental premise of Project 2061 is that the schools do not need to be asked to teach more and more content, but rather to focus on what is essential to scientific literacy and to teach it more effectively."

This research was built on the theoretical framework that ANR programs teach most of the same science objectives as other science courses and that students who complete agriscience and natural resources courses perform equally as well as students who receive science credit from other science classes.

Moss (1986) found that "A total of 76 instructional objectives from the Basic Program of Vocational Agriculture in Louisiana curriculum guide were identified as science related objectives." Anderson and Boddy (1985) stated that "specific secondary vocational programs that contain significant components of chemistry, biology, and physics related skills are: production agriculture, and horticulture" (p. 8).

Many educators believe that agriscience and natural resources is an excellent method for teaching science. Budke (1991) stated, "agriculture provides a marvelous vehicle for teaching genetics, photosynthesis, nutrition, pollution control, water quality, reproduction, and food processing where real live examples can become part of the classroom experimentation and observation" (p. 4).

Two research studies have shown that students taught science using agricultural and natural resources perform equally or better than students taught science using traditional instructional methods. Whent and Leising (1988) reported, "agricultural students in test schools achieved slightly higher on the biology test than did bio-science students" (p. 14). The researchers concluded that agricultural students were mastering the state science standards on an equal level with students in general science classes. Enderlin and Osborne (1991) studied science achievement of middle school science students. The researchers compared a laboratory oriented agricultural approach with a traditional science instruction approach in teaching a plant science unit of study. Enderlin and Osborne

also used a post-test only, control group design for their study. The researchers concluded, "student acquisition of science knowledge differs significantly between those students who receive agriculturally oriented laboratory instruction in science and those students who receive traditional science instruction." The agriculturally oriented students received higher scores.

Purpose and Objectives

Agriscience and natural resources (ANR) programs utilize activity-oriented instructional methods to instruct students in science. However, many parents, educators, and administrators do not feel that agriscience and natural resources classes are viable alternatives to more traditional science courses for high achieving college-bound students. Is agriscience and natural resources a legitimate science course? Do students who enroll in agriscience and natural resources classes perform as well on science tests as students who take more traditional science classes. These are a couple of questions that this research study attempted to answer.

The purpose of this research is to determine the influence of science courses (including agriscience and natural resources) on students' science achievement test scores.

A research hypothesis was used to test the influence of science courses on students' science achievement test scores. The hypothesis stated:

H_0 Students who had agriscience and natural resources courses will have mean scores equal to students who did not have agriscience and natural resources courses.

Using the research hypothesis as a guide, an alternate hypothesis, H_1, was developed.

H_1 Students who had agriscience and natural resources courses will have mean scores that are not equal to students who did not have agriscience and natural resources courses.

For testing purposes, the hypotheses were diagramed as follows with μ_1 represents those students who had agriscience and natural resources classes and μ_2 representing those students who did not have agriscience and natural resources classes.

$$H_0 \quad \mu_1 = \mu_2$$

$$H_1 \quad \mu_1 \neq \mu_2$$

Procedures

This study was a pre-experimental study that used a static-group comparison design. The independent variable in this study was the number of credits students had completed in science classes, including agriscience and natural resources. Extraneous variables included gender, race, grade point average, socioeconomic status, and school characteristics. Subjects' socioeconomic status was determined using a family information questionnaire.

The dependent variable in this study was science achievement of high school students. A standardized science achievement test developed by a professional test development company, American Testronics, was used to measure the dependent variable. Content and face validity of the instrument was determined by American Testronics. A Kuder-Richardson reliability coefficient of .85 was reported for the test (American Testronics, 1990).

The population for this study was all seniors in four Michigan high schools that offered agriscience and natural resources classes. The four schools were selected from those schools that offered agriscience and natural resources classes and had completed the restructuring process to become a agriscience and natural resources programs. The total population consisted of 156 senior high school students. Only seniors were tested because they had completed all science classes required for graduation.

Analysis of Data

The data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+)(SPSS Inc., 1991). Frequencies, means, standard deviations, t-tests, correlations, semi-partial and multiple regression were used to analyze the data.

Results

Seniors at participating high schools completed a family information survey. The survey contained questions pertaining to the students' parents' or guardians' occupation and level of education, family income, and household possessions. Each response was coded with a specific value.

Parents' Occupations

Over 32% of the seniors listed craftsman as the occupation of their father or male guardian. Twenty-six percent of the respondents listed clerical as the occupation of their mother or female guardian. Table 1 shows the frequencies and percentages for each occupation of students' parents or guardians.

Parents' education levels

The highest level of education for a majority of the seniors' fathers and mothers was high school. Smaller percentages had attended either vocational/technical school or some college. Table 2 shows the frequencies and percentages in each category.

Parents' Income

Over 35% of the seniors indicated that their families' income was between $20,000 and $34,999, followed by $35,000 or more, and $19,000 or less. Twenty-three percent of the seniors did not know their families' income or did not respond to the question. Table 3 shows the frequencies and percentages in each income category.

Table 1

Occupation of students' parents or guardians

Occupation	Father/male guardian		Mother/female guardian	
	N	%	N	%
Laborer	23	15.8	5	3.9
Service	5	3.4	16	12.5
Operative	21	14.4	6	4.7
Craftsman	38	26.0	7	5.5
Farmer, Farm Manager	10	6.8	3	2.3
Protective Services	3	2.1	1	0.8
Proprietor or owner	19	13.0	7	5.5
Sales	1	0.7	5	3.9
Clerical	4	2.7	42	32.8
Professional	6	4.1	17	13.2
Technical	2	1.4	2	1.6
Manager/ Administrator	9	6.2	11	8.6
School Teacher	3	2.1	6	4.7
Professional-physician	2	1.3	0	0.0
Totals	146	100.0	128	100.0

Table 2

Highest level of education

Level of Education	Father/male guardian		Mother/female guardian	
	N	%	N	%
Less than high school	11	7.5	8	5.2
High school graduate	81	55.1	77	51.0
Vocational/trade, business school, or less than 2 years of college	44	29.9	54	35.8
Completed college	9	6.1	11	7.3
Advanced degree	2	1.4	1	0.7
Total	147	100.0	151	100.0

Table 3

Family income

Income	Frequency	Percent
$19,000 or less	21	13.4
$20,000 to $34,999	55	35.3
$35,000 or more	44	28.2
Don't know/ or missing	36	23.1
Total	156	100.0

Household Possessions

Seniors were asked whether they had specific possessions available to them in their home. Some of the possessions listed included a place to study, newspapers, books, calculator, computer, VCR, and CD player. Responses were coded with a value of two if the item was available, or a value of one if the item was not available. Scores were then included in the socioeconomic status calculation. Table 4 outlines the number and percentage of respondents who had the item in their home. All respondents, 100%, indicated that they had a color television in their home. Only 30.1% of respondents had a compact disc (CD) player, and 34.5% had a computer in their homes.

Table 4

Household possessions

Items	N	%
A specific place to study	84	54.2
A daily newspaper	117	75.5
Encyclopedia, reference books	133	86.9
Typewriter	125	80.6
Electric dishwasher	75	48.4
Two or more working cars/trucks	144	92.9
More than 50 books	136	87.7
Own room	134	87.0
Pocket calculator	146	94.8
Color TV	155	100.0
Computer	53	34.6
Video tape recorder (VCR)	148	95.5
Computer disc (CD) player	46	30.1

Z scores were calculated for each individual's socioeconomic status. Z scores were then categorized into quartiles for reporting purposes. Raw Z scores were used for regression analysis.

Seniors were asked four demographic questions. The questions asked for the seniors' gender, age, race, and current grade point average. Fifty-four percent of the high school seniors were male and 46% were female. The youngest senior was 17 years old and the oldest was 19 years old. The mean age for all the seniors was slightly over 17½ years. Over 86% of the seniors were white, 7.2% were black, 2.0% were American Indian, 1.3% were Asian, and 0.7% were Hispanic.

The seniors were asked to specify their current grade point average. In order to increase the validity of the research, the information that the seniors provided was checked with their official school records. Where discrepancies existed, the official grade point average was used for analysis. Seniors were also asked to list the different science classes they had completed and the grade they received. Grade point averages for students who had completed classes in agriscience and natural resources were calculated.

The mean grade point average for all students was 2.70 with a standard deviation of .69. The total number of science credits and agriscience and natural resources credits was determined from the questionnaires. All credits were measured using Carnegie units. The mean number of science credits completed for all respondents was 2.79. The mean number of agriscience credits completed was 1.47. Over 100 seniors (69%) never had a class in agriscience and natural resources. Forty-nine students (31.4%) did have classes in agriscience and natural resources. Table 5 displays the means, standard deviations, minimum, and maximum number of credits for the respondents.

The High School Subject Test - Biology that was used to measure science achievement consisted of 60 multiple choice questions. The mean score of all seniors who completed the test was 22.79.

Table 5

Mean number of science and agriscience and natural resources credits completed by respondents

Class	N	Mean	S.D.	Min.	Max.
Science credits	156	2.79	1.13	.5	6.0
Agriscience and Nat. Resources	49	1.47	.79	.5	3.5

Correlational Analysis

Correlations were performed to determine if the dependent variable, score on the science achievement test, could be correlated with demographic variables of the students. Because all variables were measured on the interval scale, Pearson product-moment coefficients were used for the correlations. The correlations found a substantial positive (Davis, 1971) correlation between students' grade point average and their science achievement test scores. There was a moderate correlation between students' scores and the number of science credits they had completed. Results of the correlations are shown in Table 6.

Table 6

Correlations between students' science achievement scores and various demographic variables

Variable	Coefficient	Description
Overall G.P.A.	.57	Substantial
Science credits	.49	Moderate
Agriscience and Nat. Resources G.P.A.	.27	Low
Socioeconomic status	.24	Low
Agriscience and Nat. Resources Credits	-.07	Negligible

Regression Analysis

Semi-partial multiple regression coefficients were calculated for three variable sets. The first set included six demographic variables. The semi-partial regression (sR^2) was .08 for the demographic variable set. The overall grade point averages were added to the equation. The GPA produced a semi-partial coefficient (sR^2) of .27. The final variable set was the number of science credits completed. Semi-partial regression (sR^2) for this variable set was .07. Table 7 shows the results of the semi-partial regression analysis.

Table 7

Semi-partial regression coefficients for independent variable sets with science achievement scores

Variable Set	sR^2	F
Overall G.P.A.	.27	.0000 *
Demographic variables	.08	.0177 *
Science credits	.07	.0000 *
Total	.43	.0000 *

* $p<.05$

A multiple regression analysis was conducted to determine which independent variables were associated significantly to the students' scores on the science achievement test. The beta value indicates the amount of change associated with the intercept for each unit of the variable being measured. The comparison group for the regression analysis was white senior high school students. Students' overall G.P.A. and the number of science credits completed were the significant variables in the regression. Table 8 contains the data from the regression analysis.

Table 8

Multiple regression of students' science achievement scores on their independent variables

Independent Variables	Beta (β)	t value
Intercept	-6.26	.67
Demographic variables		
ANR students/ non ANR students	-1.56	.13
Gender	-1.26	.19
Age	.74	.36
Blacks	-1.14	.56
Race (other than black or white)	2.20	.26
Overall G.P.A.	4.70	.00 *
Science credits	2.08	.00 *

* $p<.05$
$R^2 = .43$

The regression analysis was used to determine if seniors who had agriscience and natural resources (ANR) classes differed from seniors who did not have ANR classes on the science achievement test. Alpha was set *a prior* at .05. Because H_0 was a non-directional hypothesis, a two tailed t-test was used. Two-tailed probability was .13 with a t value of -1.48. No significant differences were found between the two groups. Therefore, H_0 was tenable. The alternative hypothesis, H_1, was rejected.

Conclusions

This research found that high school seniors who had agriscience and natural resources classes performed equally as well as seniors who did not have agriscience and natural resources classes on the science achievement test. The multiple regression, while controlling for extraneous variables such as age, gender, socioeconomic status, and science credits completed by students, found no significant differences between seniors who had ANR classes and those that did not have ANR classes.

The regression also determined that high school seniors' overall grade point averages and the number of science credits they completed had a direct relationship to their scores on the science achievement test. Forty-three percent of the variance was explained.

Recommendations

Based on the conclusions of this study, the following recommendations have been made:

1. All students completing agriscience and natural resources courses should be awarded science credit towards graduation from high school.

2. Agriscience and natural resources courses should be recognized as a science class by college admissions personnel when evaluating students' college applications.

3. High school students should be encouraged to take as many credits of science, including agriscience and natural resources, prior to graduation.

This research is important for all schools in the United States that offer, or are considering offering, agriscience and natural resources programs. The results document the fact, students who complete ANR classes comprehend science concepts equally as sell as students who complete more traditional science classes such as biology or chemistry. Therefore, agriscience and natural resources classes that use "hands-on," inquiry-based instructional methods, should be viewed as legitimate science courses and recommended to students of all ability levels.

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THE INFLUENCE OF AGRISCIENCE AND NATURAL RESOURCES CURRICULUM ON STUDENTS' SCIENCE ACHIEVEMENT SCORES

Alan A. Kahler, Iowa State University -- Discussant

This study, in my estimation, focuses on a topic that is of concern to agricultural educators throughout the nation. The authors provided a very sound theoretical basis for the study, the purpose was clearly stated, and the objectives were stated as hypotheses. While I understand what was intended, I felt that the H_O was really the H_A and the H_A was the H_O.

The procedures were easy to follow. I had several questions that, if answered, would have added to a better understanding of the results reported. How were the extraneous variables used in the study selected? Was their literature to support the use of these variables? Was the biology test item analyzed to make sure all test questions were valid questions? Did you need to use such high powered statistical procedures to satisfy your hypotheses?

The results reported were interesting and provided information to reflect on the hypotheses. I always have difficulty with correlation coefficients that are labeled moderate or substantial when they are .5 or lower.

The conclusions summarized well the significant findings of the study. Students who had ANR classes had achieve as well as those who did not in science. This is good to know. However, is the fact that overall grade point and the number of science credits completed new? This has been reported in a number of other studies. Some recognition of this fact would be appropriate.

Are your really ready to recommend that science credit be given toward graduation, ANR courses be recognized as a science class by college admissions personnel, and students take more science classes based on the results of your study of four ~Michigan high school science and ARN programs? Why didn't you recommend replication of your study, particularly before you infer that this study is important to all schools in the United States.

Based on your findings, how would you respond to a principal who proposes that the science department be expanded to include a course in agricultural science and drop the agriculture and natural resources program.

FFA AND SAE PARTICIPATION AS PREDICTORS OF THE CAREER MATURITY OF SECONDARY AGRICULTURAL EDUCATION STUDENTS

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INTRODUCTION

During the high school years youth face several major developmental tasks, one of which is preparing for occupations (Havighurst, 1972). According to Westbrook, Sanford, Mervin, Fleenor, and Gilleland (1988), choosing an appropriate occupation for oneself has been considered as one of the hallmarks of career maturity. What is career maturity? A review of the definitions of Super (1955), Jarvis (1990), Super and Thompson (1979), Fouad (1988), Jordaan and Heyde (1979), Super and Overstreet (1960), Diley (1965), Glaize and Myrick (1984), and Crites (1964) would indicate that career maturity is the individual's readiness to make educational and career decisions. Career mature students, as indicated by Crites (1964), have more realistic views about the world of work. They use their greater knowledge about self and work to take more responsibility for their own career planning. Much has been said about the career maturity of high school students in general. Most studies have shown that the level of career maturity differs among students. Students have different levels of career maturity even though they possess similar characteristics.

Many high school students enroll in agricultural science classes as early as Grade 9. To enroll in a specific program like agricultural science is an important decision. The decision they make will impact their career options. According to Jarvis (1990) at grade nine students have not even established a tentative career goal. If students have not yet established a tentative career goal, then they make rational career decisions? Once students have entered an agricultural education program how are they assisted in their career development? Literature in agricultural education shows that many opportunities are available for students to develop and enhance career development. Specifically, students can participate in FFA activities and Supervised Agricultural Experience (SAE) programs. How does the FFA contribute to career development? The FFA Advisors Handbook (National FFA Center, 1975) showed that FFA activities can: (1) foster career awareness, exploration, and vocational and technical preparation, (2) encourage students to become entrepreneurs, (3) encourage occupational growth through continuous counsel of the FFA advisors, (4) prepare members for adult occupational responsibilities, and (5) encourage occupational excellence and pride.

Many studies on SAE have been done. However, according to Rawls (1982), research on educational and occupational benefits derived from SAE is limited. Rawls (1982) found that parents of agricultural students perceived that SAE programs were beneficial to their children in the areas of work attitude, occupational development, and human relations. Pals (1989) reported that the five greatest benefits of SAE were: promoting the

acceptance of responsibilities, developing self-confidence, providing opportunity to learn on own, developing independence, and learning to work with others.

No studies have been found which have investigated the relationship between FFA and career maturity, or between SAE and career maturity. Thus, this inquiry was undertaken to assess the career maturity of agricultural students and to determine the relationship between FFA participation and career maturity, and between SAE participation and career maturity.

PURPOSE AND OBJECTIVES

In order to describe the career maturity of agricultural education students and to determine the relationships between career maturity and participation in FFA and SAE, the following objectives were adopted:

1. Describe the career maturity of agricultural students in Ohio.

2. Examine the relationship between participation in FFA and career maturity.

3. Examine the relationship between participation in SAE andc a r e e r maturity.

4. Examine the relationship between other independent variables (participation in extracurricular activities, personological characteristics, and other school experiences) and career maturity.

PROCEDURES

Design

The design of the study was ex post facto. Using this design, two types of research hypotheses, the primary and control hypotheses were tested.

Population and Sample

The population of the study was high school agricultural students in Ohio enrolled in the 1991-1992 school year. Cluster random sampling was employed, using an anticipated 95% risk level, .05 degree level of precision, an estimated standard deviation of 0.5. The sample size was 529.

Instrumentation

The Career Development Inventory (Thompson, Lindeman, Super, Jordan, and Myers, 1979) was used to assess the career maturity of agricultural students. The five sub-scales of the inventory are: career planning, career exploration, decision-making, world-of-work information, and knowledge of preferred occupation. The scores of each sub-scale, except the score of knowledge of preferred occupation were added together to produce a career orientation total scores. The career orientation total score reflects the level of student's career maturity. The reliability estimates of this inventory ranged from .82 to .87. The sub-scale

knowledge of preferred occupation was not used because of the inappropriateness of reading level for students in grade nine and ten.

Information related to the independent variables were collected using an instrument developed by the researcher. A panel of seven experts consisting of agricultural educators in the Department of Agricultural Education at Ohio State University reviewed the instrument for face and content validity. Following the recommendations by the panel, the instrument was improved. After changes, it was pilot tested with 30 high school agricultural students form a school that was not selected for the study. A test-retest procedure revealed a percent of agreement of 85% to 100% for most questions.

Data Collection

Data were collected from March through May, 1992. The researcher traveled to most of the selected schools to administer the Career Development Inventory. Instrument related to demographic variables were mailed to teachers at least a week before the scheduled administration of the Career development Inventory. A total of 529 students completed the instruments; however, only 495 of the instruments were useable.

Analysis of Data

Data were analyzed using the Statistical Package for the Social Science, Personal Computer version (SPSS/PC+). Dummy coding with multiple correlation coefficients, Pearson correlations for interval data, and Kendal Tau-b for ordinal data were used to describe the relationships.

FINDINGS

To determine if students who returned the useable and students who returned the non-useable questionnaires differed, a t-test was performed. The mean career orientation total of students returning the useable questionnaires (92.8, n=495) and non-useable questionnaires (86.03, n=34) were compared. The two groups did not differ significantly ($t = 1.93$; $p > .05$) so it was assumed that the findings of this study could be generalized to the accessible population.

Agricultural science students' career maturity scores ranged from 47 to 147. The mean was 92.8 and the standard deviation was 19.8. The sample of this study was compared to the norm group of the instrument (Table 1). The career maturity mean score for twelfth-graders was 92.7 as compared with the norm group mean of 104.9; the eleventh-graders mean score was 96.6 as compared with the norm group mean of 104.0; the tenth-graders mean score was 91.0 as compared with the group mean of 100.2; and the ninth-graders mean score was 91.7 as compared with the group mean of 93.8. The agricultural science students, except for those in the ninth-grade, scored significantly lower than the norm group.

Table 1

Mean and Standard Deviation of Career Orientation Total Scores of Ohio Agricultural Students and the Norm Group

Grade Level	Ohio Agricultural Students			Students from Norm Group				
	Mean	Sd.	n	Mean	Sd.	n	t	p
9th	91.7	21.8	138	93.8	19.1	1249	.18	> .05
10th	91.1	18.3	134	100.2	17.8	1402	5.70	< .001
11th	96.5	19.7	113	104.0	20.0	1269	4.03	< .001
12th	92.7	18.9	110	104.9	21.3	1047	6.70	< .001

There were low associations (Table 2) between career maturity and FFA participation scores (r = .21), leadership position in the FFA (r = 21), the number of the FFA awards at chapter level (r = .29), total hours of involvement in leadership capacities (r = .11), and between total hours of involvement in non-leadership related activities (r = .11). There was no relationship between career maturity and SAE involvement.

Table 2

Correlations between Career Maturity and FFA Involvement

Variables	Career Orientation Total Scores
FFA scores	.21***
Years in FFA	.08*
Leadership in FFA	.21***
Hours of leadership involvement	.11**
Hours in nonleadership involvement	.11**
Hours of involvement as a member only	-.04
Chapter awards	.29***
Above chapter awards	.04

*** = p < .001; ** = p < .01; * = p < .05

Statistically significant correlations were found between career maturity and all measures of extracurricular activities involvement (Table 3). A moderate association existed between career maturity and the number of organizations in which students belonged (r = .33). Low associations were found between career maturity and extracurricular involvement scores (r = .28), leadership position (r = .21), hours of involvement in leadership position (r = . 16), hours of non-leadership involvement, and hours of participation in sport (r = .16). There was a negligible association between career maturity and involvement as a member only (r = .08).

Occupational aspiration, educational aspiration, school location, and school type were treated as nominal variables. The multiple correlation coefficient was used to describe the relationships between occupational aspiration, educational aspirations, and between school location and career maturity (Table 4). Both educational and occupational aspirations correlated moderately with career maturity (R = .39 and R = .36 respectively). Students who intended to go to college scored significantly higher as compared to students who did not want to go to college. Students who planned to work in managerial, administrative, and executive; professional (eg. engineers, doctors, teachers etc) jobs; and entrepreneurs scored significantly higher than those who did not have such aspirations. GPA correlated moderately with career maturity (r = .30). Low correlations existed between career maturity and location of schools (R = .22), participation in career development activities (r = .21). Students who studied in urban schools, semi-rural schools, and rural/suburban schools scored significantly higher than students who studied in rural and suburban schools.

Table 3

Correlation between Career Maturity and Participation in Extracurricular Activities

Variables	Career Orientation Total
Extracurricular involvement	.28***
Number of organizations	.33***
Leadership position	.21***
Hours of leadership involvement	.16***
Hours of non-leadership involvement	.18***
Hours of involvement as a member only	.08*
Hours of participation in sport	.12**

*** = p < .001; ** = p < .01; * = p < .05

Table 4

Correlation between Other Educational Experiences and Career Maturity

Variables	Career Orientation Total
GPA	.30***
Participation in career development	.21***
Employment experience	-.03
Number of years in agricultural education	.08*
Occupational aspiration	.36[a]***
Educational aspiration	.39[a]***
Type of school	.08[a]*
Location of school	.22[a]***
Grade level	.03[b]

*** = p < .001; ** = p < .01; * = p < .05

[a]multiple correlation coefficients; [b]tau-b

Both sex and location of residence were dummy coded (Table 5). There were low correlations between career maturity and sex (r_{pb} = .25), between career maturity and location of residence (R = .13). Female students scored significantly higher as compared to male students. No significant correlation existed between career maturity and socioeconomic status, and between career maturity and age.

CONCLUSION AND RECOMMENDATIONS

This study showed that agricultural students at the 10th, 11th, and 12th grade scored significantly lower than students from the norm group. Since career maturity is an important part of career development that might have an impact upon one's future, efforts should be made to improve the level of career maturity of agricultural students in Ohio.

Participation in the FFA correlated positively with career maturity. This shows that there was some advantage of participation in the FFA with respect to career development, thus students should be encouraged to exploit the opportunities available in the FFA.

None of the SAE variables correlated with career maturity. Further investigation should be conducted to determine the extent to which the current SAE program is effective in developing responsibilities and providing for career exploration. A more elaborate procedure of assessing student's participation in SAE should be employed. The objective would be to provide a more precise assessment of SAE participation, or to identify specific aspects of SAE that might be related to career maturity.

Table 5

Correlation between Personological Variables and Career Maturity

Variables	Career Orientation Total
Sex	.25[a]***
Location of residence	.13[a]*
Socioeconomic status	-.01[a]
Age	-.04

*** = < .001; * = p < .01; [a]multiple correlation coefficients.

Other variables that significantly correlated with career maturity were occupational aspiration, educational aspiration, grade-point average, participation in career development activities, type of school, location of school, sex, location of residence, and participation in extracurricular activities. These findings were consistent with studies by other researchers. Age, grade level, SES were not correlated with career maturity. These findings were inconsistent with other related studies.

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FFA AND SAE PARTICIPATION AS PREDICTORS OF THE CAREER MATURITY OF SECONDARY AGRICULTURAL EDUCATION STUDENTS

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The authors of this research study are to be commended for selecting a topic which connects accountability to components of the secondary agricultural education program. The findings provide interesting focus for those in the profession in a time of curriculum and program change. The authors are to be further commended for the clarity with which the purpose, objectives and results of the study are presented.

Maturity, in-part, relates to psychological growth. The foundation for the conceptual framework of this study could have been enhanced had the psychological readiness of high school students to make career decisions been more thoroughly researched in the literature and appropriately cited. Even though the central term, career maturity, is defined as readiness to make educational and career decisions, its use provides confusion. Career maturity seems to be more logically descriptive of the arrival and progression within a selected career. Further confusion is noted with this term in the study when used interchangeably with career orientation. Possibly career orientation is a more appropriate term.

The discussion of instrumentation does not address how the elimination of the knowledge of preferred occupation subscale affects the comparison of the study's scores to the norm scores of the inventory. Further it would seem if the reading level of one subscale were deemed inappropriate for the students of grade level 9 and 10, the other subscales may also be suspect.

The authors are commended for the direct way in which their conclusions and recommendations address the objectives of the study. As previously stated, the findings of this study should provide interesting focus for the profession. It is, at least initially, troubling to think that "cornerstones" such as FFA and SAE have such small affects on educational and career decisions. It is, however, important to view these findings in the proper perspective. Perhaps a closer review of the educational psychology literature would shed light on this speculation. There seems to be some ambiguity in the literature on the consistency of terminology used in describing magnitude of correlation. It would serve to aid future reviewers of this study if a citation of the source for the correlation categories of slight, low, and medium was given.

FACTORS RELATED TO THE EGALITARIANISM OF AGRICULTURAL EDUCATION IN COMPREHENSIVE AND VOCATIONAL SCHOOLS

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Introduction

From the beginning of the American experience (Leighbody, 1972), there has been a strong tradition of egalitarianism which has helped to create the goal of a classless society as a national ideal. Those who framed the political structure of the United States and wrote its constitution did everything possible to prevent class distinctions based upon birth, and they refused to permit the creation of any sort of royalty or of a titled class. Yet every thoughtful American knows that a hierarchy of social class exists in this country and that it is closely related to occupations (p. 124).

In response to enabling vocational education legislation, several states, including Ohio, developed a system of area vocational schools at the secondary level of education. However, this system has not operated without its critics. There are many disadvantages in having separate schools for vocational education. "The information available suggests that separate vocational schools have higher costs, have higher dropout rates, and seem to promote socioeconomic segregation" (Evans & Herr, 1978, p. 219). The result of such schools in some states has been a dual system of education. When vocational education is relegated to a separate school, different and unequal treatments based on the race, sex, and social class of incoming students may be the result. The Ohio Council on Vocational Education (1990) has recommended recently that future vocational facilities be built on regular school campuses rather than as separate entities.

Agricultural education at the secondary level is offered in both vocational and comprehensive high schools in rural Ohio. The traditional agricultural production and agricultural science programs have generally been offered in the comprehensive high schools. Specialized programs in such areas as horticulture, farm management, animal production and care, agricultural mechanics, natural resources, forestry, and food processing have been offered in area vocational schools. Agricultural business programs are in both types of facilities, depending on decisions made at the local level.

Oakes (1986) feels that the events and assumptions that led educators to split the secondary school curriculum into academic and vocational halves are at the root of current troubles. Tracking most often works to the academic detriment of students who are not placed in the "more academic" tracks. Since agricultural education is offered in Ohio in

comprehensive schools (where students can enroll and still prepare for advanced education) and in area vocational centers (where it is impossible for students to meet requirements for unconditional admission to a university), a question arises as to whether students enrolling in these two types of agricultural education programs possess different characteristics. If so, do these differing characteristics provide evidence of a dual and perhaps an unequitable educational system?

In 1985, Oakes suggested that many educational scholars agreed that an underlying function of vocational education was to segregate poor and minority students into occupational training programs in order to preserve the academic curriculum for middle and upper class students. In this way the differentiated curriculum served to reinforce the racial and socioeconomic stratification of society. Could this same criticism be leveled at agricultural education programs in Ohio? Is it family socioeconomic status that differentiates students so some are assigned to receive agricultural education at area vocational schools rather than at comprehensive high schools?

Purpose and Objectives

The major purpose of this study was to describe differences in the characteristics of students attending comprehensive high schools and those attending joint vocational schools for study in agricultural education. The objectives were to describe the two groups on the following variables: (1) socioeconomic status, (2) academic performance, (3) occupational aspirations, (4) educational aspirations, (5) number of siblings, (6) influence of peers, teachers, parents, and guidance counselors on educational decisions, (7) gender, (8) race, (9) parent educational level, and (10) location of residence. It was also an objective of this study to determine if attendance at a particular type of school could be predicted based upon student background.

Procedures

Design. The design of the study was exploratory and correlational.

Population and Sample. The population of the study was rural high school eleventh and twelfth grade agricultural students in Ohio enrolled during the 1991-1992 school year. Cluster random sampling was employed, using a 95% probability of a margin of error of less than 5%. The sample included all the agricultural education students who studied under 41 randomly-selected teachers.

Instrumentation. Data measuring the variables were collected using an instrument developed by the researcher. A panel of agricultural educators in the Department of Agricultural Education at Ohio State University reviewed the instrument for face and content validity. After changes, it was then pilot tested with high school agricultural students from a school that was not selected for the study. The test-retest procedure revealed a percent of agreement of .84.

Data Collection. Data were collected in May and June of 1992. The survey instruments were mailed to the schools after telephoning the teachers and

obtaining their permission. All teachers agreed to participate, however, only 39 of 41 teachers returned questionnaires. A total of 502 students completed useable instruments.

Data Analysis

Data were analyzed using the Statistical Package for the Social Science, Personal Computer version (SPSS/PC+). School type was cross-tabulated with other variables. Chi square and Cramer's V were used to determine statistical significance and the strength of the relationships. Discriminant analysis was used to determine if students could be correctly classified according to the type of school by the other variables included in the questionnaire. Statistical significance was based on a .05 level of alpha.

Results

There were 212 respondents (42%) from area vocational schools and 290 (58%) from comprehensive high schools. Fifty-five percent were juniors and 45% were seniors.

Socioeconomic Status (SES). The median family income of the responding sample was in the $25,000 to $35,000 category. Students from the two types of schools did not differ significantly in family income. As a quasi measure of SES, subjects were asked to check whether they had the following items in their homes: newspaper, encyclopedia, typewriter, two or more cars or trucks, dishwasher, personal computer, video tape recorder, room of own, and compact disk player. Comprehensive students were significantly more likely to have an encyclopedia, dishwasher, personal computer, and compact disk player. There was no difference on the other items.

Academic Performance. Students in area vocational schools and in comprehensive high schools did not differ significantly in self-reported grade point average. The mode category reported by students from both types of schools was one-half "B" and one-half "C" grades.

Educational Aspirations. Comprehensive high school students had significantly higher educational aspirations than the area vocational students (Table 1). There were 28.7% of the comprehensive school students who hoped to attend a 4-year university as compared to 5.7% of the area vocational school students. Over one-half (53.8%) of the vocational school students and 29.1% of the comprehensive high school students planned to enter work directly after high school graduation. The Cramer's V describing this relationship was .34. Agriculture as a future area of study was chosen by 31.1% of the vocational school students and 22.0% of the comprehensive high school students.

Table 1
Educational Aspiration Beyond High School of Vocational and Comprehensive Students

	Vocational		Comprehensive		All Students	
Type of Institution	n	%	n	%	n	%
Four Year College/University	12	5.7	83	28.7	95	19.0
Technical College	34	16.0	40	13.8	74	14.8
Junior College	33	15.6	47	16.3	80	16.0
Military	12	5.7	30	10.4	42	8.4
Work	114	53.8	84	29.1	198	39.5
Other	7	3.3	5	1.7	12	2.4
Missing Cases	-	-	1	-	1	-
Total	(212)	100.0	(290)	100.0	(502)	100.0

Cramer's V = .341
Chi-square = 508, $p < .05$

Number of Siblings. Comprehensive students had slightly more siblings than did the area vocational school students. The mean number of siblings for all respondents was 1.56.

Influence On Educational Decisions. Parental influence on curriculum selection did not differ by type of school. Teachers had significantly more influence on student curriculum selection (Table 2) in area vocational schools than in comprehensive high schools (Cramer's V = .22). The influence of guidance counselors and friends did not differ by type of school.

Table 2
Influence on Educational Decisions by Teachers

	Vocational		Comprehensive		Total	
Extent	n	%	n	%	n	%
A Great Deal	56	27.5	44	15.7	100	20.7
Some	49	24.0	57	20.4	106	21.9
Very Little	58	28.4	138	49.3	196	40.5
None	41	20.1	41	14.6	82	16.9
No Response	8	-	10	-	18	-
Total	212	100	290	100	502	100

Cramer's V = .22
Chi-square = -34.6, p. <.05

Gender. The percentage of women agricultural education students was higher at the area vocational school (26.6%) than at the comprehensive school (18.0%).

Ethnic Background. There was no difference in racial composition by type of school, however, 94% of the students classified themselves as white or caucasian. American Indian students comprised 2.2% and African American students comprised 1.4% of the sample.

Parent Educational Level. The educational level of the mother (Table 3) was significantly higher for the comprehensive agricultural education student than for the area vocational student (Cramer's V = .21). There was little difference in the educational level of fathers by school type.

Table 3
Educational Attainment of Mother

	Vocational		Comprehensive		All	
Amount of Education	n	%	n	%	n	%
Less than High School	2	(1.0)	3	(1.0)	5	(1.0)
Attended Some High School	30	(14.8)	21	(7.3)	51	(10.4)
High School Graduate	116	(57.1)	180	62.7	296	(60.4)
Technical College	14	(6.9)	40	(13.9)	54	(11.0)
Four Year College/ University	17	(8.4)	29	(10.1)	46	(9.4)
Advanced Degree	6	(3.0)	6	(2.1)	12	(2.4)
Do Not Know	18	(8.9)	8	(2.8)	26	(5.3)
No Response	9	(-)	3	(-)	12	(-)
Total	212	(100)	290	(100)	502	(100)

Mother Educ: Cramer's V = .21
Chi-square = 21.4, $p < .05$

Location of Residence. Comprehensive high school agricultural education students were significantly more likely to live on a farm than area vocational students (Table 4) and area vocational students were significantly more likely to live in a city or suburb than comprehensive school students (Cramer's V = .28).

Table 4
Location of Residence

	Vocational		Comprehensive		Total	
Type of Residence	n	%	n	%	n	%
On a Farm	55	26.1	140	48.6	195	39.1
In a Rural Area	69	32.7	94	32.6	163	32.7
In a suburb/of Town	43	20.4	19	6.6	62	12.4
In a City	44	20.9	35	12.2	79	15.8
No Response	1	-	2	-	3	-
Total	212	100	290	100	502	100

Cramer's V = .28
Chi-Square = -26.22, $p > .05$

Discriminant Analysis. A stepwise discriminant analysis procedure was selected since stepwise variable selection combines the features of forward selection and backward elimination. The first variable included in the analysis has the largest acceptable value for the selection criterion. After the first variable is entered the value of the criterion is reevaluated for all variables not in the model, and the variable with the largest acceptable criterion value is entered next. The variable entered first is then reevaluated to determine whether it meets the removal criterion. If it does, it is removed from the model. The criterion for entry in this model is Wilks' lambda. At each step the variable that results in the smallest Wilks' lambda (unexplained variance) is selected for entry.

Data for the discriminant analysis are summarized in Table 5. Nominal data were not included in the discriminant analysis. The income variable and the number of items in the home variables were standardized and combined to form one SES variable. Extra-curricular activities, number of agriculture courses, academic performance, number of male siblings, time spent discussing college with parents, and SES were found to be discriminating variables in predicting attendance at either area vocational or comprehensive high schools. The significance test indicates that the two groups' centroids were significantly different (vocational, -.84 and comprehensive, .54) based on the six predictor variables. The discriminant function explained 31% (Rc = .56) of the variance. The proportion of variance not explained by the discriminant function was 69% (Wilks' lambda = .69). The eigen value is .46 which indicates that this function can explain .46 times as much as is not being explained.

Table 5
Summary Table for Discriminant Analysis

Variables	Discriminant Function 1			
	b	s		
Extra Curricular Activities	.60	.65	Vocational Comprehensive	-.84 .54
Number of Ag Courses	.60	.66		
Academic Performance	.27	-.05		
# of Male Siblings	.34	.24		
Time Spent Discussing College with Parents	.29	.34		
Socioeconomic Status	.07	.16		
Eigen Value	R_c		Wilk's Lambda	p
.4581	.5605		.6858	<.0001

b = standardized discriminant function coefficient
s = within group structure coefficient
R_c = canonical correlation coefficient

A total of 74% of the cases were correctly classified as shown in Table 6. Further examination of Table 6 revealed that 75% of the vocational students and 72% of the comprehensive students were correctly classified. The Tau statistic that was calculated indicated that classification based on the discriminating variables resulted in 58% fewer errors than would be expected by random assignment or by chance alone.

Table 6
Classification of Cases

Actual Group	# of Cases	Predicted Group	
		Vocational	Comprehensive
Vocational	212	159 (75.0%)	53 (25.0%)
Comprehensive	290	80 (27.6%)	210 (72.4%)
Percent of Cases Correctly Classified: 74.51			

Means and standard deviations for discriminating variables are reported in Table 7. Examination of Table 7 reveals that comprehensive school students, as compared to vocational school students, participated in fewer extra-curricular activities, enrolled in more agriculture courses, were lower in academic performance, had more male siblings, spent more time discussing college plans with parents, and were higher in socio-economic status.

Table 7
Means and Standard Deviations for Discriminating Variables

Discriminating Variables	School Types	
	Vocational (n=161)	Comprehensive (n=250)
Extra Cur. Activities	2.32 (.83)	3.18 (1.03)
Number of Ag. Courses	1.57 (.71)	2.22 (.72)
Academic Performance	3.65 (1.51)	3.59 (1.46)
# of Male Sibling	.61 (.74)	.91 (1.02)
Time Spent Discussing College with Parents	2.41 (1.08)	2.90 (1.00)
Socioeconomic Status	-.08 (1.51)	.24 (1.43)

Conclusions and Recommendations

It appears that in addition to the variables appearing in the discriminant analysis, educational aspirations, teacher influence on educational decisions, gender, and location (rural vs. urban) are variables which differentiate area vocational from comprehensive high school students.

Agricultural educators should be concerned about the low percentage of non-white students enrolling in agricultural courses. It is anticipated that by the year 2010, 34% of the population in the United States will be non-white. Since the percentage of minority students will continue to grow, it is important that these groups be served if agriculture and agricultural education is to be representative of society at large.

Socioeconomic status, even though it appeared in the discriminant analysis, did not seem to be a major factor in differentiating agricultural education students by type of school. Even though the overall student body at the two types of schools may differ on SES, there appears to be little difference between the agricultural education students enrolled at the two locations. Agricultural educators need not be overly concerned about the tracking that occurs within the discipline, but may continue to be concerned about tracking which may be continuing between students in academic and vocational disciplines. The homogenity of agricultural education students is an indicator that students may be being placed in these programs because of background.

Since there was sufficient difference to correctly classify a very high percentage of students into type of school by the discriminant analysis, there is sufficient evidence to continue to explore the meaning of these differences. Further research is recommended on issues related to the tracking of all students, not just agricultural education students, into area vocational and comprehensive high schools.

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FACTORS RELATED TO THE EGALITARIANISM OF AGRICULTURAL EDUCATION IN COMPREHENSIVE AND VOCATIONAL SCHOOLS

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The premise upon which this research was undertaken is indeed an interesting one. The authors are to be commended for doing exploratory research in the area to establish a basis for further investigation. I further commend them for their thorough treatment of the data in responding to the purpose and objectives of the study.

It was difficult to follow the conceptual framework of the study to bring a definite focus on the "current troubles" which the research was to address. The statement, "When vocational education is relegated to a separate school, different and unequal treatments based on the race, sex, and social class of incoming students may be the result," seems to be a rather strong position to take without verifiable reference. The literature indicates this position is a comparative one of cultural bias likely to occur regardless of institution. Also, the documentation of this study insinuates that students have no choice in whether to attend a comprehensive or vocational high school. Several references are made to students either being assigned or placed. Is this an assumption of administrative intervention?

The results of the study are well stated. Under the variable measure of socioeconomic status, the quasi-measure of material items, although interesting and found to have significance, seems too highly subjective from which to ascertain any meaning. The significantly higher educational aspirations of the comprehensive high school students would not seem to come as any surprise given the difference in mission of the schools. Attention of the authors is called to a clerical error in the narration accompanying Table 7. I believe it should read that comprehensive school students participate in <u>more</u> extra-curricular activities.

In regard to the first conclusion of differentiation between area vocational and comprehensive high school students, I would submit that these variables differentiate between institutions just as much or possibly more than between students. I heartily agree with the authors to the importance that students of agricultural education understand and recognize the benefits of a pluralistic society. However, it may be difficult and even undesired by the non-white society to create a representative presence in agricultural education reflective of the United States society. It is important for the profession to be sensitive and responsive to this need. In the third conclusion regarding student differences, it appears as though the authors are taking issue with the egalitarian theme of the study. Essentially equality has been found, and now a concern is expressed about homogeneity. This appears to be a no win situation. I commend the authors on their recommendation for further research in the area. They have explored the area and surfaced some interesting insights which can be further clarified through additional investigation.

AN EXAMINATION OF INDICATORS OF SCHOOL EFFECTIVENESS AMONG CLASSES OF SCHOOL LOCATION IN OHIO PUBLIC SCHOOLS

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Introduction

In recent years, public policy concerning education has seen an increased emphasis upon the outcomes of education, particularly in terms of accountability (U. S. Department of Labor, 1992). The national rhetoric involving public schooling resonates with the notion of "doing more with less". Some researchers have suggested that rural and smaller schools are often some of the most effective ones (Howley, 1989; Goodlad, 1984), while others (Peasley & McCracken, 1992) have indicated that rural schools may be less effective in terms of student achievement. One common theme in school effectiveness research has been the use of a single criterion variable to operationalize school achievement.

Stephens (1992) has outlined several political trends that are affecting rural schools in the United States. First, there has been a reduction of the federal government's role since 1980, which coincides with the reduction of federal revenue sharing for state and local governments. There has been a continuing increase in the concentration of population around metropolitan areas (U. S. Bureau of Census, 1991), which has led to a dramatic shift in the alignment of political power, both at the state and federal levels. Not surprisingly, the fiscal pressures upon local rural governments have increased. Rural governments have had to bear more of the financial burden of maintaining their infrastructure. This situation has left rural school districts facing increasing competition for local tax revenues. This increased competition for resources has had an adverse effect on rural communities ability to fund schooling at the level that urban communities do.

Schools in rural communities have to work harder to fund programs than do schools in more urban communities (Harl, 1985). Rural areas will continue to be negatively affected in terms of their ability to provide for adequate public education (Stephens, 1992). Bass and Verstagen (1992) conducted a national survey of state educational funding policies and found vast differences in the way that states equalize for factors related to a school's geography and enrollment level. It is imperative that scholarship regarding school effectiveness between classes of school location be conducted so that educational policy makers can make informed decisions about equitable resource allocation.

Historically, agricultural education has always served rural communities (True, 1929). Although agricultural education has, in recent years, sought to provide relevant education for a more diverse range of communities, agricultural education programs still exist in rural communities. Baker (1990) found that the vast majority of rural school districts had agricultural education programs. It is important for agricultural educators to participate in inquiry which informs both the scholarship and the policy debate regarding rural schools.

Research in Ohio has studied rural schools in terms of student

aspirations (McCracken, Wims, & Barcinas, 1991; McCracken & Odell, 1989), voter behavior (Baker, 1990), curriculum (Elliot & McCracken, 1989), achievement (Peasley, Baker, & McCracken, 1991; Baker, 1990); school expenditure patterns (Peasley, Baker, & McCracken, 1991); and school location as a predictor of student achievement (Peasley & McCracken, 1992). Peasley and McCracken (1992) found that location was unrelated to student achievement after controlling for socioeconomic factors. However, they used only one measure of student achievement in their analysis. Subsequently, they recommended that research should be conducted to examine multiple indicators of school effectiveness among classes of school location.

Purpose and Objectives

The purpose of this study was to examine indicators of effectiveness among classes of school location in Ohio public schools. The following objectives guided the study:

1. To describe the effectiveness of Ohio public schools in terms of student achievement on: standardized measures of language, mathematics, and reading in the fourth, sixth, and eighth grades; and the percentage of ninth school students who passed a state-wide proficiency test.
2. To compare the effectiveness of Ohio public schools among the classes of school location (rural, semi-rural, rural/suburban, suburban, and urban).

Procedures

The study was descriptive in nature. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were collected from records compiled by the Ohio Department of Education in April, 1991. Indicators of school effectiveness included: standardized measures of math, reading, and language achievement in the fourth, sixth, and eighth grades; and the performance of high school students on a state-wide proficiency examination required for graduation in Ohio. All of the above tests have gone through an extensive field and pilot testing procedure to establish validity, suitability, and reliability (Ohio Department of Education, 1991).

The specific measures of fourth, sixth, and eighth grade achievement were expressed in terms of the percentage of scores in a district which were above the fiftieth normal curve equivalent (NCE) for the standardized test. Measurement of student achievement on these bases allowed for direct comparison between schools at the district level (Linn, 1992).

Performance on the proficiency exam was expressed as the percentage of ninth grade students in each district who passed this criterion referenced test. This test is divided into four sections-reading, mathematics, writing, and citizenship. Students must achieve a minimum of 80% correct on each of the four sections to pass the exam. Beginning in 1994, students will have to have passed this examination in order to receive a diploma. School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the objectives.

Schools were classified into one of five location categories based

upon 1990 U. S. Census data as follows: **rural** schools (N=69) were those schools located in counties that had a population less than 40,000 and were not contiguous to a Metropolitan Statistical Area (MSA); **semi-rural** (N=101) schools were located in counties with a population greater than 40,000 and were not contiguous to a MSA; **rural/suburban** schools (N=45) were located in counties with a population less than 40,000 and were contiguous to a MSA; **suburban** (N=185) schools were located in counties with a population greater than 40,000 and were contiguous to a MSA; and **urban** schools (N=202) were located in counties classified as a MSA.

Table 1
Means and Standard Deviations of Selected Indicators of Student Achievement of Ohio Public School Districts By School Location, 1990 (N=612).

Measure	Rural N=69	Semi-Rural N=101	Rural/ Suburban N=45	Suburban N=185	Urban N=202
Fourth Grade					
Reading Mean	55.0	56.0	58.2	61.2	63.9
S.D.	11.6	11.7	10.8	11.0	12.8
Math Mean	49.8	49.5	54.9	54.6	59.4
S. D.	13.2	15.8	13.2	13.1	14.5
Lang. Mean	50.5	53.2	55.8	57.8	62.1
S. D.	12.8	12.5	13.2	12.4	14.2
Sixth Grade					
Reading Mean	56.0	53.7	58.8	58.7	62.6
S.D.	12.7	12.0	10.4	10.9	13.7
Math Mean	54.2	52.7	59.0	56.9	60.5
S. D.	15.5	15.1	13.3	13.1	15.0
Lang. Mean	53.7	51.7	55.4	55.8	60.6
S. D.	13.9	12.6	12.3	11.9	14.1
Eighth Grade					
Reading Mean	54.5	57.8	60.5	60.3	64.1
S.D.	12.2	9.7	10.6	10.5	13.5
Math Mean	49.8	52.5	57.5	55.5	60.5
S. D.	14.0	14.8	15.0	13.3	15.4
Lang. Mean	52.4	53.8	59.6	57.3	61.3
S. D.	13.4	10.8	14.6	11.9	13.9
Ninth Grade Proficiency					
Mean	29.2	31.9	42.0	36.7	40.4
S.D.	10.3	11.0	16.0	11.8	15.9

Note: Fourth, sixth, and eighth grade scores expressed in percent of students in district above the fiftieth NCE on the standardized test. Ninth grade scores expressed in terms of percentage of students in district who passed the criterion referenced proficiency examination.

Results

A summary of the means and standard deviations of the measures of student achievement are summarized in Table 1. Median comparisons of the measures are visually highlighted in Figures 1 through 4. At the fourth grade level, student achievement for urban schools are higher than all other classes of school location. Rural and semi-rural schools appear to have the lowest overall levels of achievement, especially in terms of mathematics and language skills. Rural/suburban and suburban schools appear to have somewhat similar levels of achievement at the fourth grade level.

At the sixth grade level, urban schools again have the highest levels of achievement for all three academic measures. Semi-rural schools have the lowest levels of achievement, followed by the rural class of schools. Rural/suburban and suburban schools again have very comparable levels of student achievement.

In terms of eighth grade indicators, urban schools again have the highest levels of student achievement. Rural schools have the lowest levels of achievement in all three areas. Rural/suburban and suburban schools yet again appear to have nearly identical levels of student achievement.

There are also differences in student achievement among the rates of successful completion of the proficiency examination. There is a ten point gap in success rates between rural schools and urban schools. There is also a large difference between rural/suburban schools and rural and semi-rural schools.

Examination of the measures of variation of these indicators reveals that variances for each academic measure are relatively consistent within and across classes of school location at the fourth, sixth, and eighth grades. The measure of high school proficiency, however, shows that the classes of school location with highest levels (rural/suburban and urban) also had the highest variances. One should note this as a caveat when interpreting these results.

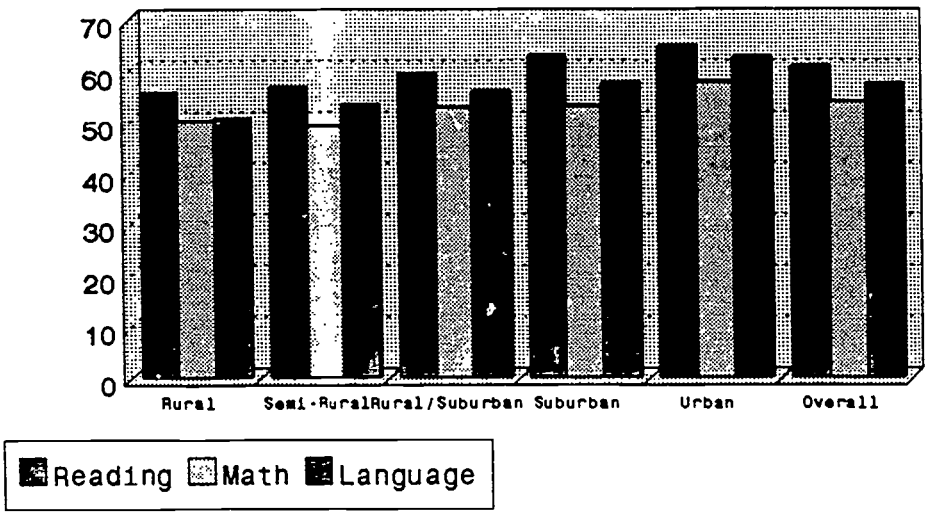
Other caveats to note are the size of some of the differences that exist. In some cases, the difference in percentages from the highest to the lowest score is less than eight points; and in other cases the difference from the highest to the lowest score is thirteen points. The authors acknowledge that the practical meaning of these differences is open to interpretation. A final note is that the measures of fourth, sixth, and eighth grade achievement are expressed as the percentage of students scoring above the 50th percentile of the norm group. When one considers this, it can be concluded that all classes of school location are performing at or above "average" in terms of these indicators.

Conclusions and Recommendations

Real differences exist in indicators of school effectiveness among classes of school location in Ohio public schools. Students in rural and semi-rural locations do not achieve as well as students in rural/suburban, suburban, and urban locations. Leaders of rural and small schools in Ohio should use the results of this research to provide an adequate context for describing the performance of their schools. It may be more informative for leaders of small schools to compare their schools with those schools

Figure 1: Median Fourth Grade Achievement Between Classes of School Location

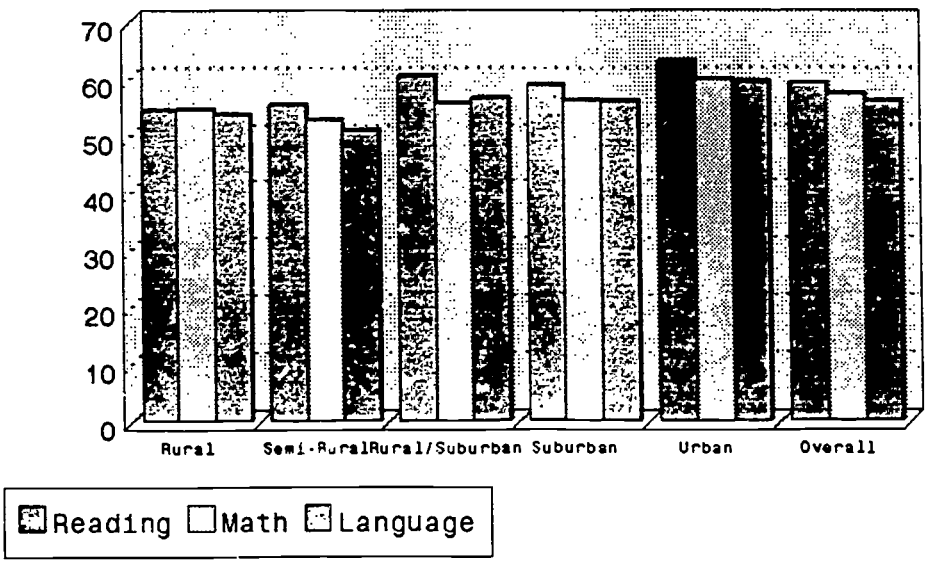
Ohio Public Schools, 1990-91



Expressed as % of students above 50th NCE

Figure 2: Median Sixth Grade Achievement Between Classes of School Location

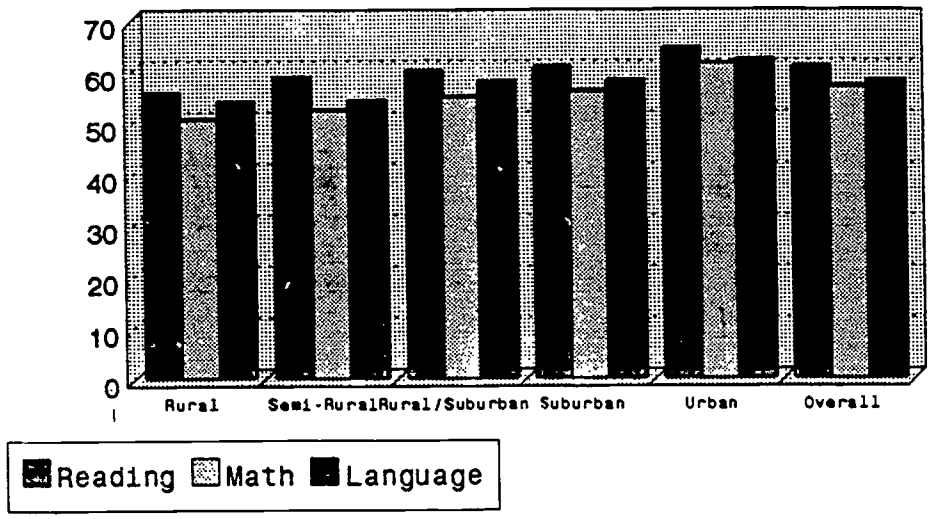
Ohio Public Schools, 1990-91



Expressed as % of students above 50th NCE

Figure 3: Median Eighth Grade Achievement Between Classes of School Location

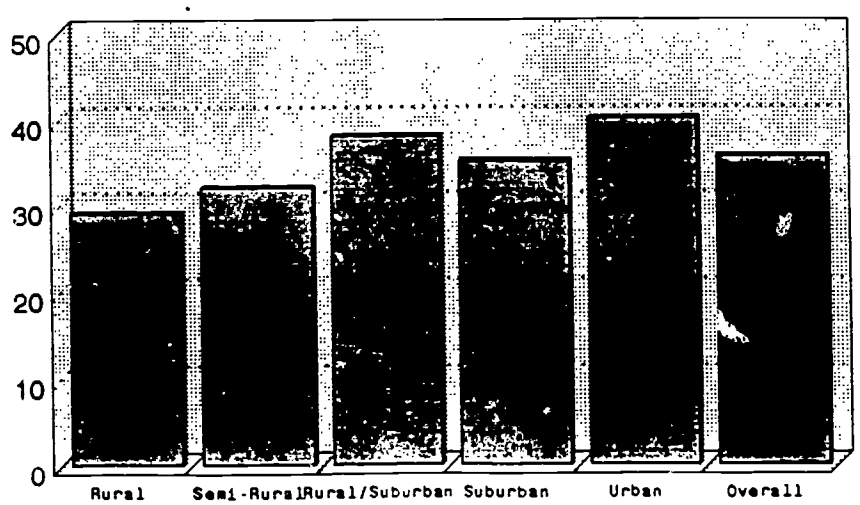
Ohio Public Schools, 1990-91



Expressed as % of students above 50th NCE

Figure 4: Median High School Achievement Between Classes of School Location

Ohio Public Schools, 1990-91



Expressed as % of students who have passed the proficiency exam

that are similar in location (rural, semi-rural, etc.) as opposed to an overall average for Ohio schools, which is heavily weighted by the number of suburban and urban districts.

The findings of this study support Peasley and McCracken's (1992) contention that rural and semi-rural schools achieve at a lower rate than do other classes of school location. Examination of the processes that contribute to student achievement should be conducted within classes of school location to understand this difference in achievement.

This study relies on data from one academic year. A longitudinal study should be conducted in order to determine if the differences in the indicators of school effectiveness are part of a continuing trend.

Rural/suburban schools and suburban schools have nearly equivalent levels of achievement. This finding generates an interesting question--are rural/suburban schools more like suburban schools in terms of achievement because these classes of school location are similar in terms of their similar locations (e.g., nearness to metropolitan areas)? This may provide an avenue for future research. It also brings into question the efficacy of the rural/suburban school location.

This study relies on the measurement of student achievement to describe school effectiveness. This may problematic. As McCaslin (1990) and others have suggested, there are likely other outcomes which can describe a school's effectiveness. Research should be conducted to identify other indicators of school effectiveness to enable school policy makers to more accurately describe schooling outcomes. One goal for this type of inquiry might be to develop a functional model for assessing school effectiveness which relies on a variety of quantitative indicators.

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AN EXAMINATION OF INDICATORS OF SCHOOL EFFECTIVENESS
AMONG CLASSES OF SCHOOL LOCATION IN OHIO PUBLIC SCHOOLS

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The authors of this study are to be commended for the sound conceptual framework developed through a review of the pertinent literature from which the need for the research problem was deduced. The purpose for and objectives of the study are well stated. In it's totality this is a sound, well done study.

Even though the authors note at the bottom of Table 1 defines the source of the scores, the mixture of 4, 6, and 8 grade normal curve equivalent scores and ninth grade proficiency scores is, at first glance, deceiving. Possibly, two separate tables should be considered. The results of the study make for interesting reading and reflection.

In regards to the conclusions of the study, I question whether the authors can unequivocally state that "Students in rural and semi-rural locations do not achieve as well as students in rural/suburban, suburban and urban locations." I would suggest that leaders may use the results of this research along with other sources of evidence as adequate context for describing the performance of their schools. It does, however, appear that real differences do exist in reading, math and language achievement of the fourth, sixth and eighth grade students, and the proficiency level of the ninth grade students researched. The authors are commended for their recommendations regarding further study. These recommendations serve to provide purposeful direction for important analysis into this important area of societal concern.

STAGE OF ADOPTION AND LEVEL OF KNOWLEDGE OF SUSTAINABLE AGRICULTURAL PRACTICES BY CENTRAL IOWA FARMERS

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The growing public concern about groundwater contamination, pesticide residue, soil erosion, and wildlife habitat runs parallel to "an emerging interest by many farmers for a more cost-effective and environmentally benign agriculture" (USDA, 1990). But only a small number of farmers are using alternative farming systems (Board of Agriculture, 1989). According to Stenholm and Waggoner (1990), the cause of the limited adoption of sustainable agricultural practices is the lack of dissemination of clear and reliable information. "Although science has accumulated a great base of knowledge of potential benefit to alternative agriculture, research and extension have not focused on integrating this knowledge into practical solutions to farmers' problems" (Board of Agriculture, 1989). The link between research and reality is still tenuous.

Producers adopting alternative practices strive for profitable and ecologically sound ways to use the unique potentials of the physical, chemical, and biological resources of their farms. They must weigh all the features that make the practice they are considering for adoption either beneficial or injurious. The attributes most generally taken into consideration in the adoption of innovations are relative advantage, compatibility, complexity, trialability, and observability. The adoption process includes the four stages preceding adoption of an innovation: awareness, information seeking, evaluation, and trial (Rogers, 1983).

Some examples of alternative sustainable agricultural practices are crop rotation, integrated pest management, tillage practices, and animal-health maintenance. Information on these and other practices was given at two Central Iowa Extension conferences on sustainable agriculture. External evaluation, months after the conferences, was needed to determine the effect of the conferences and to discover what influenced adoption of specific sustainable agricultural practices. Results of the study might help in the search for more effective ways of program delivery, a concern for Extension as they manage a scarce resource--time (Radhakrishna et. al., 1991). According to Geasler (1989), Extension has not yet reached the point at which the first question asked by staff in program planning is "what method of program delivery would achieve the greatest adoption of information?" Suggesting an answer to this question would assist Extension staff in planning their use of time.

Purposes and Objectives

The purposes of this study were to compare the level of adoption and the level of information about sustainable agricultural practices of attendees and nonattendees before and after a set of Extension programs and to identify preferred delivery methods and the attributes of innovations that influenced adoption.

Objectives were (1) to compare management practices before and after the set of programs, (2) to determine the attributes of sustainable agricultural practices that influenced their adoption, (3) to identify preferred sources of information on sustainable agricultural practices, and (4) to compare those who attended the conferences with those who did not.

Methodology

This was an ad post hoc, quasi-experimental study, with the population consisting of farmers (approximately 9,000) from nine central Iowa counties. The sample of 143 in the treatment group selected themselves by attending the two Extension conferences on sustainable agriculture. The control group of 143 was a stratified random sample of farmers in the nine counties who did not attend. Population lists were supplied by the County Extension Offices in the nine counties. The 286 central Iowa farmers received a mailed questionnaire in the spring of 1991. The mailed questionnaire was developed after a preliminary telephone study involving five purposively selected farmers who were members of Practical Farmers of Iowa (PFI), an organization interested in sustainable agriculture. The questionnaire was reviewed for content validity by farmers who had been speakers at the two conferences, faculty and personnel from the College of Agriculture, and members of the Central Iowa Extension committee that organized and conducted the conferences.

Frequencies, means, and standard deviations were used to describe the responses. A conservative test, the Kruskal-Wallis, was used to determine whether adoption, level of information, and sources of information reported by attendees were significantly different at the .05 level from those reported by nonattendees. The 20 practices were grouped according to farming-system categories to reduce possible statistical error . The Kruskal-Wallis test was used to determine the mean change in adoption and level of information before and after the Extension conferences. Participants were asked to reflect on their practices before the 1990 cropping season (before the conferences) and also from then to present. Rockwell (1989) called this method "post-then-pre-evaluation." By asking participants after the program to describe their behavior (posttest) and then to recall their behavior before the program (pretest), the descriptions may be more accurate "because limited knowledge before the program prevents them from accurately assessing baseline behaviors" (Rockwell, 1989). Care must be taken when interpreting the differences between before and after, for changes might have occurred because of factors other than the one in question.

The return rate was 76 percent for attendees and 57 percent for nonattendees. Because late respondents are considered similar to nonrespondents, those who responded to the first mailing were compared with those who responded to the second mailing on seven questions chosen randomly from the research instrument. The Kruskal-Wallis test for generating a probability of a greater Chi-square statistic revealed no significant differences, except in the reported use of farm machinery dealers as an information source.

Cronbach's alpha reliability coefficients were calculated for each section, resulting in the following values: .88 for degree of adoption, .93 for level of information, and .77 for sources of information, all acceptable figures according to Nunnally (1982).

Findings

Attendees and nonattendees were similar in age; for both groups, the largest segment was the 40-49 year-old group (29% for attendees and 28% for nonattendees). For both attendees and nonattendees, the largest segment was the income level $30,000-$49,999 (26% of attendees and 33% of nonattendees). Both groups had increased their level of

Table 1. Attendees'[a] adoption and level of information of sustainable agriculture practices before and after Extension conferences

Practice		Adoption of practices[b] Prior to 1990	Adoption of practices[b] 1990 to Present	Level of information[c] Prior to 1990	Level of information[c] 1990 to Present
Diversify cropping system	M[d]	2.08	2.38	3.23	3.48
	SD[e]	1.24	1.27	1.03	0.95
Soil & leaf testing for nitrogen needs		2.20	2.56	3.06	3.44
		1.38	1.35	1.05	1.02
Reduce rate of nitrogen application		2.84	3.17	3.16	3.59
		1.34	1.31	1.00	0.96
Supplement commercial fertilizer with animal or green manure		3.18	3.39	3.57	3.75
		1.76	1.64	1.06	0.95
Scout field to determine if weed control is needed		3.37	3.65	3.49	3.73
		1.53	1.37	1.05	0.93
Scout field to determine if insect control is needed		3.02	3.28	3.29	3.50
		1.65	1.57	1.11	1.07
Control weeds through increased cultivation		3.28	3.58	3.79	4.06
		1.57	1.41	1.05	0.89
Control insects through crop rotation		3.86	3.96	3.84	3.93
		1.41	1.34	0.99	0.92
Reduce herbicide application		2.99	3.20	3.71	3.88
		1.52	1.51	1.03	0.96

[a]Attendees: N=95.

[b]Adoption of practices: 1=aware; 2=gathering more information; 3=trial use; 4=fine tuning; 5=permanent use.

[c]Level of information: 1=not informed; 2=slightly; 3=moderately; 4=well; 5=highly.

[d]M = mean.

[e]SD = standard deviation.

Table 1. Continued

Practice		Adoption of practices[b] Prior to 1990	Adoption of practices[b] 1990 to Present	Level of information[c] Prior to 1990	Level of information[c] 1990 to Present
Discourage livestock dunging in hutches	M[d]	2.08	2.43	2.46	2.61
	SD[e]	1.35	1.50	1.43	1.38
Use of pasture farrowing		2.11	2.06	3.21	3.28
		1.51	1.41	1.34	1.30
Use of intensive pasture grazing rotation		2.08	2.51	3.00	3.40
		1.23	1.33	1.18	0.99
All-in, all-out, & vacant, buying & selling livestock to reduce disease		2.83	3.02	3.40	3.43
		1.65	1.63	1.29	1.26
Reduce use of fall plowing		3.87	4.15	4.08	4.17
		1.57	1.37	1.13	1.04
Use of post emergence herbicides		3.90	4.20	3.97	4.06
		1.28	1.05	1.01	0.94
Reduce erosion by conversion of row crop acreage to cover crop		2.39	2.71	3.50	3.71
		1.44	1.45	1.14	1.03
Soil test for phosphorus & potassium needs		4.39	4.49	4.18	4.24
		1.14	1.07	0.98	0.91
Take nitrogen credits for past season's legume crop		4.10	4.23	4.08	4.18
		1.40	1.29	1.09	0.97
Use of ridge tillage for row crops		1.97	2.22	3.30	3.50
		1.45	1.56	1.18	1.15
Strip cropping to reduce erosion		2.19	2.45	3.19	3.48
		1.36	1.45	1.22	1.11

Table 2. Non-attendees'[a] adoption and level of information of sustainable agriculture practices before and after Extension conferences

Practice		Adoption of practices[b]		Level of information[c]	
		Prior to 1990	1990 to Present	Prior to 1990	1990 to Present
Diversify cropping system	M[d]	2.80	2.95	3.04	3.20
	SD[e]	1.84	1.78	1.19	1.07
Soil & leaf testing for nitrogen needs		2.06	2.35	2.81	3.15
		1.46	1.43	1.23	1.00
Reduce rate of nitrogen application		2.88	3.24	3.30	3.57
		1.41	1.29	0.99	0.82
Supplement commercial fertilizer with animal or green manure		3.82	3.98	3.88	4.07
		1.55	1.40	0.82	0.70
Scout field to determine if weed control is needed		3.54	3.78	3.44	3.61
		1.48	1.37	1.06	0.90
Scout field to determine if insect control is needed		3.40	3.60	3.42	3.62
		1.57	1.43	1.12	0.95
Control weeds through increased cultivation		3.57	3.67	3.77	3.88
		1.62	1.52	0.98	0.88
Control insects through crop rotation		3.78	3.88	3.63	3.68
		1.46	1.37	1.04	0.96
Reduce herbicide application		3.20	3.23	3.52	3.66
		1.60	1.63	1.17	1.18

[a]Non-Attendees: N=56.

[b]Adoption of practices: 1=aware; 2=gathering more information; 3=trial use; 4=fine tuning; 5=permanent use.

[c]Level of information: 1=not informed; 2=slightly; 3=moderately; 4=well; 5=highly.

[d]M = mean.

[e]SD = standard deviation.

Table 2. Continued

Practice		Adoption of practices[b] Prior to 1990	Adoption of practices[b] 1990 to Present	Level of information[c] Prior to 1990	Level of information[c] 1990 to Present
Discourage livestock dunging in hutches	M[d]	2.46	2.71	2.40	2.55
	SD[e]	1.33	1.44	1.31	1.39
Use of pasture farrowing		2.31	2.31	3.42	3.42
		1.75	1.75	1.22	1.22
Use of intensive pasture grazing rotation		3.05	3.00	3.43	3.74
		1.43	1.52	1.04	0.86
All-in, all-out, & vacant, buying & selling livestock to reduce disease		2.68	3.00	3.32	3.64
		1.53	1.69	1.07	1.19
Reduce use of fall plowing		4.48	4.56	4.24	4.36
		1.20	1.03	1.04	0.88
Use post emergence herbicides		3.98	4.10	3.96	4.08
		1.39	1.33	1.03	0.95
Reduce erosion by conversion of row crop acreage to cover crop		3.15	3.29	3.69	3.84
		1.51	1.52	0.90	0.80
Soil test for phosphorus & potassium needs		4.13	4.23	3.96	3.76
		1.35	1.22	1.01	1.32
Take nitrogen credits for past season's legume crop		4.15	4.22	3.83	4.00
		1.37	1.32	1.02	0.92
Use of ridge tillage for row crops		1.31	1.47	3.02	3.16
		0.87	0.97	1.30	1.25
Strip cropping to reduce erosion		2.56	2.54	3.28	3.47
		1.75	1.72	1.16	1.14

Table 3. Probability of attendance at Extension conferences affecting mean change in stages of adoption of sustainable agriculture practices

Practice	Mean[a] change in stage of adoption		P>CHISQ[d]
	Attendees[b]	Non-Attendees[c]	
Diversify cropping system	0.204	0.127	0.559
Soil & leaf test for nitrogen needs	0.333	0.273	0.405
Reduce rate of nitrogen application	0.258	0.327	0.218
Supplement commercial fertilizer with animal or green manure	0.129	0.182	0.157
Scout field to determine if weed control is needed	0.194	0.236	0.891
Scout field to determine if insect control is needed	0.204	0.200	0.528
Control weeds through increased cultivation	0.247	0.091	0.491
Control insects through crop rotation	0.097	0.091	0.762
Reduce herbicide application	0.194	-0.036	0.080
Discourage livestock dunging in hutches	0.065	0.109	0.496
Use of intensive pasture grazing rotation	0.172	-0.018	0.171

[a]Mean = expressed as change in Adoption of practices: 1=aware; 2=gathering more information; 3=trial use; 4=fine tuning; 5=permanent use.

[b]Attendees: N=95.

[c]Non-Attendees: N=56.

[d]P>CHISQ = probability of a greater Chi square.

Table 3. Continued

Practice	Mean[a] change in stage of adoption		P>CHISQ[d]
	Attendees[b]	Non-Attendees[c]	
All-in, all-out, & vacant, buying & selling livestock to reduce disease	0.043	0.163	0.363
Reduce use of fall plowing	0.258	0.073	0.798
Use post emergence herbicides	0.333	0.036	0.156
Reduce erosion by conversion of row crop acreage to cover crop	0.247	0.109	0.361
Soil test for phosphorus & potassium needs	0.108	0.091	0.301
Take nitrogen credits for past season's legume crop	0.118	0.055	0.716
Use ridge tillage for row crops	0.183	0.127	0.999
Strip cropping to reduce erosion	0.204	-0.018	0.605

information and adoption of sustainable agriculture after the conferences (Tables 1 and 2). When the means for changes in adoption levels were calculated, there was no significant difference at the .05 level between the two groups in adoption of practices (Table 3). This finding was comparable to that of Tolchinsky (1989), who studied the level of adoption of integrated Pest Management (IPM) practices in corn by farmer cooperators and noncooperators of an IPM Extension program. In both studies, nonattendees may have been indirectly receiving Extension information through other sources such as chemical dealers, farm magazines, or neighbors who were Extension cooperators.

Attendees and nonattendees listed the same top five sources of information consulted for making management decisions related to sustainable agriculture (Table 4). The top five were not in the same order for both groups, and attendees rated Extension significantly higher as a source of information than did nonattendees . For both groups, fertilizer and herbicide dealers had the highest means. In a study on adoption of soil-conservation practices (Gamon, 1992), neighbors, friends, and family were the preferred source, but agribusinesses and Extension were in the top five. Tolchinsky's respondents (1989) included dealers and Extension agents in their top five preferred sources for pesticide information.

Both attendees and nonattendees were at or beyond stage two in the innovation-diffusion process, the stage of "seeking more information," as defined by Rogers (1983). Many had reached stage three, "evaluation," or stage four, "trial" (Tables 1 and 2). An interesting finding was that attendees thought that conferences were more helpful in refining current practices than in beginning to use new ones (Figure 1).

Of the five attributes of innovations, relative advantage, compatibility, and observability were strongly and positively related to adoption of sustainable agricultural practices. Trialability was positively related, but not strongly. As might be expected, complexity was negatively related.

Respondents were interested in long-term rather than simply short-term profitability of a practice. Greater than 90 percent of the central Iowa farmers ranked long-term profitability as somewhat to quite influential, whereas the influence of short-term profitability had a normal distribution.

Respondents were well informed regarding these topics: reduction in use of fall plowing, use of postemergence herbicides, soil testing for phosphorus/potassium needs, and taking credit for past season's legume crop when calculating fertilizer needs. They were poorly-informed regarding diversification of cropping systems, soil and leaf testing for nitrogen needs, discouragement of livestock dunging in shelters, pasture farrowing, and strip cropping to reduce erosion.

Conclusions and Recommendations

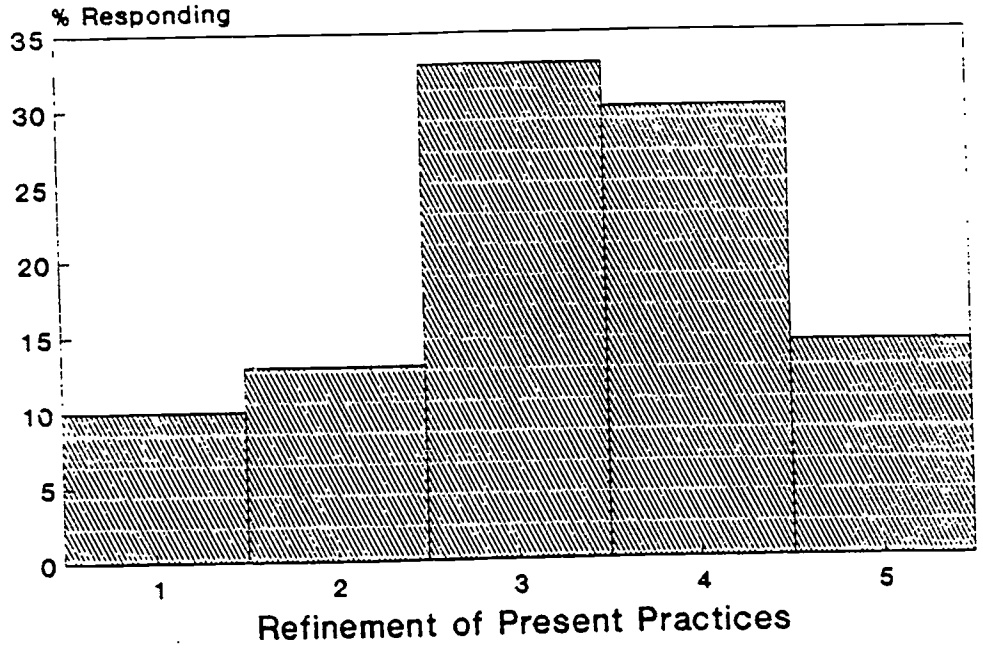
The effect of attendance at two central Iowa Extension sustainable agriculture conferences was studied. There was an overall trend toward increased level of information and adoption of sustainable agricultural practices, but there were insignificant differences between farmers who attended and those who did not. Differences for level of information and adoption of practices were also insignificant before and after the conferences. This finding suggests that it is time for Extension educators to change their emphasis on meetings and conferences as methods for reaching clientele. New delivery methods and educational approaches are vital.

Table 4. Probability of differences between attendees and non-attendees in degree of use of information sources

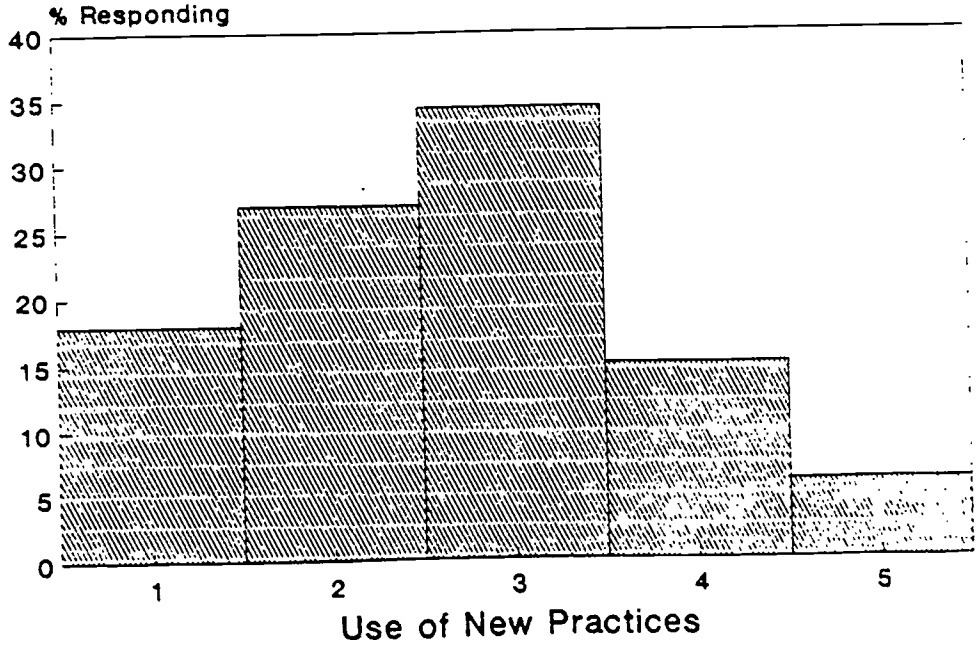
Source	Attendees[a]		Non-Attendees[b]		
	Mean[c]	Rank	Mean	Rank	P>CHISQ[d]
Fertilizer and herbicide dealers	3.46	1	3.61	1	0.296
County Extension Service	3.43	2	3.00	4	0.006**
Farm magazines and publications	3.42	3	3.41	2	0.956
Soil Conservation Service	3.30	4	3.00	4	0.080
Neighbors, family, friends	3.22	5	3.33	3	0.595
Iowa State University Experiment Station	3.14	6	2.74	7	0.033*
Personal consultation with Area Extension Crop Production Specialist	2.77	7	2.08	11	0.000**
Seed dealers	2.76	8	2.80	6	0.759
Farm organizations	2.59	9	2.22	10	0.039*
Livestock feed dealers	2.48	10	2.61	8	0.658
Farm machinery dealers	2.46	11	2.35	9	0.444
Practical Farmers of Iowa	2.15	12	1.72	12	0.030*
High school agriculture teachers	1.53	13	1.47	13	0.958

[a]Attendee: N=95.
[b]Non-Attendee: N=56.
[c]Mean: 1 = Never; 2 = Seldom; 3 = Sometimes; 4 = Frequently; 5 = Always.
[d]P>CHISQ = probability of a greater Chi square.
*Significant at .05 level.
**Significant at .01 level.

Figure 1



Scale: 1 = low; 5 = high



Extension needs to target chemical dealers for increased programming efforts related to sustainable agriculture; dealers were the top source of information for both attendees and nonattendees. All agribusinesses should be seen as important partners in the agricultural education process. Extension also needs increasingly to provide unbiased research-based information to farm magazines and other publications. Extension should consider increasing field demonstration days to assist farmers at the trial stage of adoption of practices.

Agricultural educators in central Iowa should focus future sustainable agriculture programs on crop diversification and on testing for nitrogen needs. They should focus less on practices close to being fully adopted, such as reduction of fall plowing and use of postemergence herbicides. Long-term profitability of practices should be emphasized.

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STAGE OF ADOPTION AND LEVEL OF KNOWLEDGE OF SUSTAINABLE AGRICULTURAL PRACTICES BY CENTRAL IOWA FARMERS

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The authors have combined two timely topics in this study of central Iowa farmers: sustainable agricultural practices and extension program delivery. Background information was presented to indicate the importance of the topic and the theoretical construct that served as a basis for the investigation. I would suggest, however, that a larger portion of the paper be devoted to developing the need for the study. Such information could have added immensely to the argument that this study is needed and should contribute in some significant way to the body of knowledge.

The methodology employed was, for the most part, appropriate and performed in an acceptable manner. The equivalence of the two groups (attendees and non-attendees) could be questioned. The control group was stratified, but the variables used for stratification are not clearly identified. What could be the basis for helping to ensure that the groups were similar? Those factors should be enumerated, and could emanate from previous literature cited. The discussion of instrumentation was excellent; the researchers identified a potential source of error in interpreting the findings from their research.

A major concern centers on the potential of non-response error. The comparison of early and late respondents was used. Why? There are several other methods that could have been used, short of ignoring non-response. Contacting non-respondents and/or utilizing known information about those non-respondents is a more acceptable method of controlling non-response error. Researchers in agricultural education may be selecting the easiest rather than the best option for helping to control non-response error. In this study, early and late respondents were found to be different on one of seven randomly chosen questions. Therefore, non-response error has not been controlled.

The researchers were fair in their assessment of why there was so little difference between attendees and non-attendees. They purport that non-attendees may also be utilizing extension information, only in an indirect manner. This assessment is further emphasized by the non-response issue. Perhaps non-attendees who responded are more favorable in their opinions regarding extension and more direct in their use of extension information that non-respondent non-attendees.

The study did open our eyes regarding the use of information sources related to sustainable agriculture, and the difficulty in obtaining defensible information concerning utilization of extension information. We must be sure that we identify one possible reason for seeing no difference in adoption between the two groups; the groups may not be different!

THE ADOPTION OF SUSTAINABLE AGRICULTURE BY IOWA FARMERS: THE SEARCH FOR AN EXPLANATORY MODEL

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Introduction

Farmers' adoption of modern agricultural technologies has played a prominent role in making American agriculture one of the most productive and dynamic systems of food and fiber production in the world. The high productivity of conventional agriculture is attested to by the fact that at the beginning of the century one farmer's output could feed six other persons, whereas by 1980 this had increased to over sixty others (Lacy and Busch 1984). However, during the last decade, there has been a paradigmatic shift occurring within the agricultural community- a shift from mere emphasis on higher productivity to include a concern for sustainability (Westra, 1990 and Beus and Dunlap, 1990). It is felt that the high productivity of conventional agriculture had been achieved at the cost of massive damage to the natural environment and troublesome social disruptions. For instance, Daubom (1986), Lacy and Busch (1984), Berry (1977), and Hightower(1973) are among those who have been critical of conventional agriculture, accusing it of what they termed the "unsettling of American Agriculture". Among the many negative consequences attributed to conventional agriculture are: the concentration of agricultural production and distribution under the control of a few large corporations, with the consequent displacement of family farmers; over-capitalization and, huge farm debts; massive environmental degradation from non-point contamination of surface and groundwater with agricultural chemicals; and the rapid depletion of non-renewable natural resources (Hightower, 1973; Berry, 1977; Lacy and Busch, 1984; Daubom, 1986; and Batie and Taylor, 1989).

In order to reverse the negative consequences of conventional agriculture, different forms of sustainable agricultural systems have been recommended as alternatives for achieving the goal of an economically profitable and environmentally sound agricultural production system. Sustainable agricultural systems have been defined in different forms, ranging from alternative, low-input, bio-dynamic, to organic farming (Batie and Taylor, 1992). For the purpose of this paper, sustainable agriculture is represented by farming systems in which the use of purchased chemical-based inputs such as fertilizers and herbicides is significantly decreased in comparison with the conventional agricultural systems (Buttel, et al., 1981). There is

however, increasing concern that, while many more farmers now seem to have a better awareness of the negative environmental and social consequences of conventional agricultural systems, this has not translated into a major shift towards the adoption of sustainable practices (Green and Heffernan,1987).

Attempts to explain the low adoption rate have been many and varied (Batie and Taylor, 1992; Young, 1989; Swanson et al.,1986; Pampel and es Van, 1977). Lovejoy and Napier (1986), for instance, blamed the little success achieved by past efforts to encourage farmers' adoption of sustainable agricultural innovations on what they termed the American penchant for attempting a technological fix for every problem. They contended that past efforts have concentrated on telling farmers of the negative environmental impact of their production systems in the hope of engendering attitudinal change and as a consequence the adoption of Best Management Practices. They pointed to the futility of such an approach, observing that findings of past research showed that farmers continued to use practices that degrade the environment even when they: 1) are aware of the negative environmental impact of their agricultural practices, 2) believe they have a social responsibility to protect the environment, and, 3) have favorable attitudes towards soil and water conservation (Lovejoy and Napier, 1986).

Such findings have raised questions about the relevance of the traditional diffusion model for explaining the adoption of conservation technologies (Lovejoy and Parent, 1982; Heffernan and Green, 1981; Pampel and Van Es, 1977). Critics argued that while the study of the adoption and diffusion of technologies under the rubric of the classical adoption-diffusion model have contributed immensely to the understanding of the adoption process as they relate to commercial farm technologies and practices, the model may not provide full explanation of the adoption process when applied to sustainable agricultural practices (es Van, 1983).

Hence, the need for new perspectives have been called for, in the study of the adoption and diffusion of sustainable agriculture, with focus on access to, and quality of information (Lovejoy and Napier, 1986), the perception of innovations (Miranowski, 1982) and the institutional and economic factors related to adoption. Smathers (1982) contended that farmers' attitude towards conservation may be important in explaining why particular practices are currently used, observing that change is more easily accepted when viewed favorably by those it affects. He therefore, concluded that it is likely that the successful adoption of conservation practices will be influenced more by a farmer's attitude and perception than any other factor. Another issue requiring further research attention is the question of the profitability and compatibility of sustainable agricultural systems within the existing structure of American

agriculture. While, some attempts have been made to provide information on this subject, what has emerged is a bipolar body of evidence from proponents and opponents of sustainable agriculture (Klepper et al., 1977, Lockeretz et al., 1981; Olson et al., 1982; Tweeten and Helmers, 1990). Hence, there is a need to find out what farmers' perceptions are with regards to the profitability and compatibility impacts of selected sustainable agricultural practices.

Purpose and Objectives

The main purpose of the study, therefore, was to determine the perceptions of selected Iowa farmers about the profitability and compatibility of selected sustainable agricultural practices, and to determine the degree to which the practices have been adopted within their farming systems. Finally, the study sought to determine the relationships between farmers' socio-demographic, attitudinal, communication and innovation perception variables, and their adoption of the selected sustainable agricultural practices. Specifically, the study had the following objectives:

1. To determine the degree to which selected sustainable agricultural practices had been adopted by Iowa farmers.

2. To determine the perceptions of Iowa farmers with regards to the profitability, and compatibility of selected sustainable agricultural practices within their farming systems.

3. To determine the farmers' personal, farm firm, communication and innovations' perception variables that were predictive of their levels of adoption of selected sustainable agricultural practices.

Methods and Procedures

The study adopted a descriptive survey design. The study was under-girded by a conceptual model which incorporated relevant elements of Ervin's General Decision-Making Model (Ervin, 1982, p.72) and the Behavioral adoption model developed by Nowak and Korsching (1983). A data base containing a list of 545 adult and young farmers was accessed from the State Department of Education for sample selection. A sample of 150 farmers was generated using an Apple computer random number generating program. A self-administered fixed-response mail questionnaire was the instrument used for data collection. The instrument was validated by a team of experts consisting of two professors in the Iowa State University's Department of Agricultural Education and Studies and an Area Extension Crop Specialist, with working and research experience in sustainable agriculture. Instrument pretesting was done with selected graduate students in the

Iowa State University Department of Agricultural Education and Studies.

Farmers' adoption of sustainable agriculture was assessed using the innovation adoption stages developed by Rogers (1983). The selected practices included: soil nitrogen testing, banded application of herbicides, crop rotation, reduced herbicide and nitrogen fertilizer rates, taking credit for manure in determining nitrogen input, use of nitrification inhibitor, mechanical weeding and spring/summer application of nitrogen. The instrument also contained items on farmers' perceptions of the innovations, their access to information, and their personal and farm firm characteristics. A total of three mailings, which included two follow-up contacts, resulted in a total of 115 usable questionnaires, representing a total response rate of 76.7%. No statistically significant difference was discovered in the response pattern of early and late respondents.

Analysis of Data

Data analysis was carried out on a computer mainframe using the Statistical Package for Social Science (SPSS). Descriptive and inferential statistical treatments such as percent, means, standard deviations, and multiple regression were applied to the data. A Post-Hoc reliability coefficient of 0.97 was obtained for the instrument.

Results

Demographic and farm firm characteristics:

An analysis of the demographic and farm firm characteristics of the respondents showed that they were very well educated and fairly young. For instance, 69.5% of the respondents fell within the age range of 20-39 years, while 33.9% had completed college level education. Their average years of farming experience was 17.5 years. The size of their farm operations ranged from 6-3000 acres with a mean farm size of 545.5 acres.

Perceptions of sustainable agriculture:

In regards to the respondents' perceptions of the profitability and compatibility of the selected practices, the data in Tables 1 and 2 indicated that the majority of the respondents had positive perceptions. For instance, 81.6%, 80.7% and 70.2% of respondents respectively, rated soil nitrogen testing, use of green manure and spring/summer application of nitrogen fertilizer as profitable practices. Most of the other practices, with the exception of the use of nitrification inhibitor, were each rated by over 40% of respondents as profitable. In the same vein, the practices were generally rated positively, in terms of their compatibility with farmers' farming systems. The data in

Table 2 indicate that banded application of herbicide, crop rotation, and nitrification inhibitor each rated as incompatible by 41.2%, 34.2% and 26.3% of respondents, respectively, were the only practices that seemed to have poor compatibility ratings.

Table 1. Distribution of respondents according to their perceptions of the profitability of selected sustainable agricultural practices

PRACTICES	Unprofitable %	Neutral %	Profitable %
NITRIFICATION INHIBITOR	33.9	47.8	18.3
CROP ROTATION	30.4	21.7	47.8
SOIL NITROGEN TESTING	3.5	14.9	81.6
SPRING/SUMMER N_2 APPLICATION	7.0	22.8	70.2
USE OF GREEN MANURE	3.5	15.8	80.7
MECHANICAL WEEDING	12.2	38.3	49.6
REDUCED RATES of HERBICIDE	15.7	34.8	49.6
BANDED HERBICIDE APPLICATION	20.9	35.7	43.4
REDUCED NITROGEN FERTILIZER RATES	15.7	40.0	44.3

Adoption of sustainable agricultural practices:

The data in Table 3 indicate the percent distribution of the respondents according to their stages of adoption of the selected sustainable agricultural practices. An analysis of the data in the table will reveal that with the exception of the use of nitrification inhibitors, and banded application of herbicide, which were each rejected by 38.3% and 41.7% of the respondents, respectively, a majority of the respondents had either adopted the other practices or were in the process of doing so. For instance, 68.7% and 62.6% of the respondents, respectively, had already adopted spring/summer application of nitrogen fertilizer, and the taking of credit

for manure in the determination of fertilizer rates. The percent of the respondents who had adopted other practices ranged form 45.2% for soil nitrogen testing; 40% for mechanical weeding; 33% for crop rotation, to 32.2% for reduced herbicide rates.

Table 2. Distribution of respondents according to their perceptions of the compatibility of selected sustainable agricultural practices

PRACTICES	Incompatible %	Neutral %	Compatible %
NITRIFICATION INHIBITOR	26.3	37.7	36.0
CROP ROTATION	34.2	16.7	49.1
SOIL NITROGEN TESTING	6.2	19.5	74.3
SPRING/SUMMER N_2 APPLICATION	7.0	13.2	79.8
USE OF GREEN MANURE	10.6	12.4	77.0
MECHANICAL WEEDING	17.5	29.8	52.6
REDUCED RATES of HERBICIDE	19.3	27.2	53.5
BANDED HERBICIDE APPLICATION	41.2	28.1	30.7
REDUCED N_2 RATES	11.4	21.9	66.7

Respondents were asked to indicate if they had reduced their input of nitrogen fertilizer and herbicide during the last three years. The percent of respondents who had reduced their herbicide and nitrogen fertilizer rates is shown in Figure 1. An analysis of the chart shows that close to 60% and 67% of respondents respectively, had reduced their rates of nitrogen fertilizer and herbicide inputs over the last three years. While 33% and 40.9% of respondents, indicated no reduction in their rate of nitrogen and herbicide application, the remaining respondents had done so, some by as much as 50%.

Table 3. Distribution of respondents according to their stages of adoption of selected sustainable agricultural practices

PRACTICES	REJECTED	AWARENESS	INTEREST	TRIAL	ADOPT
NITRIFICATION INHIBITOR	38.3	9.6	25.2	15.7	11.3
CROP ROTATION	20.9	2.6	17.4	26.1	33.0
SOIL NITROGEN TESTING	7.0	6.1	24.3	17.4	45.2
SPRING/SUMMER N_2 APPLICATION	8.7	2.6	7.0	13.0	68.7
USE OF GREEN MANURE	7.8	0.9	7.8	20.9	62.6
MECHANICAL WEEDING	13.9	0.0	14.9	31.6	39.5
REDUCED RATES OR HERBICIDE	11.3	0.9	21.7	33.9	32.2
BANDED HERBICIDE	42.1	1.8	24.6	13.2	18.4
REDUCED N_2 RATES	4.3	4.3	28.7	38.3	24.3

Multiple regression analysis of the adoption of sustainable agriculture: In order to determine the factors that best predicted a farmer's adoption of the selected sustainable agricultural practices, a multiple regression analysis was carried out. The regression model incorporated farmers' human capital variables such as education, age, years of farming experience, and farm size; their access to information and perceptions of the selected practices. The dependent variable was the respondents' sustainable agriculture adoption index, which was defined as the proportion of the nine selected sustainable practices already adopted. The result of the regression analysis as shown in Table 4 shows that variables characteristic of the classical diffusion model such as farmers' age, level of education, farm size were poor predictors of the adoption of the selected sustainable agricultural practices. Farmers' perceptions regarding the compatibility of the practices with their farming systems, which accounted for 21.75% of the variance in innovation adoption emerged as the best predictor. The only other variable that was significant at the .05 level of confidence

was the level of farmers' access to sustainable agriculture information.

Fig. 1. Percent distribution of respondents according to the reduction in nitrogen fertilizer and herbicide rates.

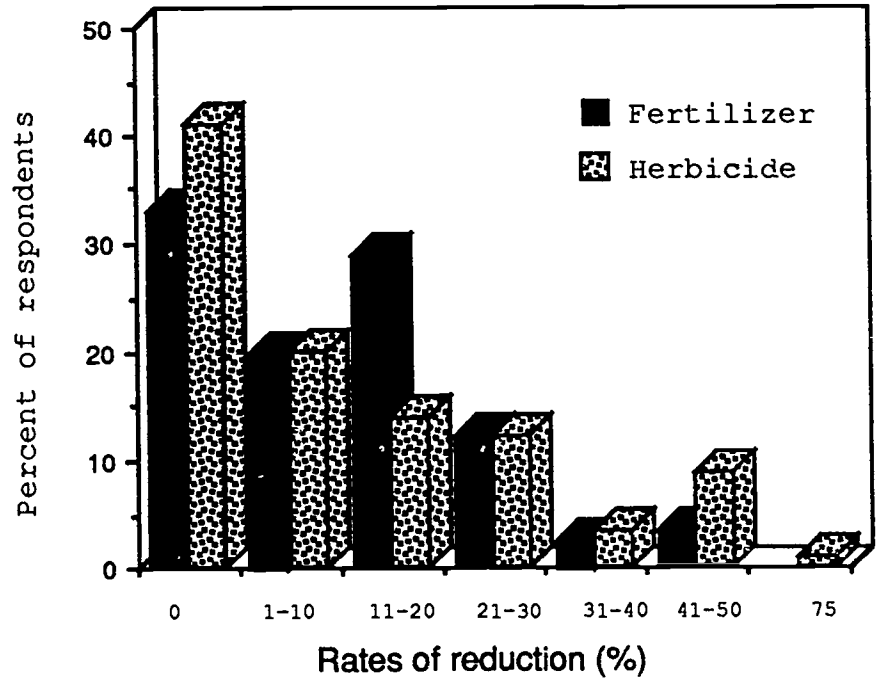

Table 4. Results of regression analysis of variables predictive of farmers' sustainable agriculture adoption index.

Predictor Variables	Multiple R	R^2	Percent Variance	F-VALUE Prob.
Perceptions of the compatibility	.466	.2175	21.75	25.00***
Level of innovation information	.511	.2615	05.02	15.75***

***P=.001.

Conclusions and Recommendations

1. On the basis of the findings of the study, it was concluded that the majority of the respondents had very positive perceptions about sustainable agriculture in terms of their profitability and compatibility. It is, however, instructive to note that many of the respondents still

expressed neutral or negative perceptions about some of the selected practices. Since, the study also showed that farmers' perceptions of the compatibility of the selected practices was the most important predictor of their adoption, it is recommended that greater policy,research and educational efforts be directed towards making sustainable agriculture as profitable and compatible as possible in order to facilitate farmers' transition from conventional to sustainable practices. This finding is also consistent with those of past studies by Miranowski (1982), Smathers (1982) and Carlson et al. (1981). For instance, Miranowski (1982), Smathers (1982), Carlson et al. (1981) found that Idaho farmers did not adopt erosion control practices in an haphazard manner, observing that farmers were more likely to adopt a practice that was perceived to be compatible with their rotation pattern than they were if they had to change their rotation pattern to accommodate the erosion control practice. The findings of these studies have several implications for educational programming. It underscores the need to consider and influence farmers perceptions of the characteristics of practices if we are to motivate them to adopt sustainable agricultural practices. For, according to Miranowski (1982), and Smathers (1982), it is likely that the successful adoption of conservation practices will be influenced more by a farmer's attitude and perceptions than any other factor.

2. Contrary to conventional wisdom regarding farmers' resistance to the adoption of sustainable agricultural practices, the findings of the study show that many farmers were either trying out some of the selected sustainable agricultural practices or had in fact already incorporated them into their production practices. For instance, over 60% of respondents claimed to have reduced nitrogen fertilizer rates. Similar findings concerning the adoption of sustainable agricultural practices by Iowa farmers have been reported by Malia and Korsching(1989). While some of the farmers might have incorporated elements of sustainable agriculture into their farming systems, it is, however, instructive to note that a large number of respondents indicated that they were at the information gathering stage with regards to the adoption of the practices. This has several implications for agricultural extension education. If these farmers at the persuasion stage in the innovation-decision process are to decide in favor of sustainable agricultural practices, they would need to be provided with adequate agronomic and economic information about the practices.
3. The multiple regression analysis of the variables predictive of the farmers' adoption of the selected sustainable agricultural practices showed that human capital and farm firm variables such as age, level of education, farm size, and tenure arrangement, usually included in the classical diffusion model, were poor

predictors of farmers' adoption rates. While, the homogeneity of the sample used in this study might well have accounted for the failure of classical diffusion variables, similar findings have been reported by other studies, Van Es (1983); Buttel et al. (1981); and Napier et al. (1984); all of whom observed that variables characteristic of the classical diffusion model were not good predictors of the adoption of conservation technologies.

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THE ADOPTION OF SUSTAINABLE AGRICULTURE BY IOWA FARMERS: THE SEARCH FOR AN EXPLANATORY MODEL

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The summary of the literature related to this study was one of the better ones I have read in the recent past. The authors have identified appropriate research and writing that leads the reader to a clear statement of the problem, purposes and objectives. So often, we seem to merely string together several references in hopes that the reader will figure out the theoretical construct we are attempting to address. Such is not the case with this paper. Well done! But one negative note must be sounded. The lack of stringent editing, at least of the copy reviewed, is not acceptable.

By and large, the methodology employed was appropriate and conducted appropriately. The potential for non-response error was not addressed adequately. Please refer to the Gamon, Harrold and Creswell discussion for an elaboration on that concern. Based on the paper reviewed, identifying the number of items on the instrument was difficult. This has an impact for the interpretation of the reliability coefficients. Also, a rather sweeping statement regarding validation opens the door to an important question. What are the qualifications of "selected graduate students" to serve as members of a validation panel?

Thanks to the authors for including demographic information for the respondents, even though there was not an objective that addressed ascertaining this information. Such an objective is often unnecessary yet frequently included in survey research.

Some may argue that simple correlations should have preceded the use of multiple regression in this study. Probably, several factors could have been eliminated from the regression model, since low r leads to low R square. However, with so few variables, no harm is done in this regression model. The authors are to be commended for not succumbing to the temptation of analytical overkill.

Conclusions and recommendations are appropriate to the findings and well-written. One could ask, however, what this all has to do with today's audience. Where are the implications for agricultural education, including teaching through extension and/or the public schools? Items one and two end with an attempt to show relevance to agricultural education. I would encourage the authors to take one more step by identifying explicitly actions that should be taken by departments of agricultural education in universities. How do we prepare our graduates differently, what additional assistance is needed for educators in agriculture, or how do we influence change as a result of this study?

Perceptions of County-Level Extension Professionals Regarding Training and Informational Needs in Sustainable Agriculture

by

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Introduction

Iowa is a leading agricultural state. Its farmers produce more corn, soybeans, and swine than any other state in America (American Farm Bureau Federation, 1991). Unfortunately, Iowa also has had the dubious distinction of leading the nation in some very alarming statistics. In 1990, Iowa led the nation in herbicide use with over 46 million pounds of weed control chemicals being applied (Pins, 1991). Iowa also leads the nation in soil erosion. Iowa croplands lose approximately 240 million tons of soil annually. That is twice the national average (Soil Conservation Service, 1986). Iowa farmers spend between $300 million and $400 million each year on nitrogen fertilizers, this amount is 10 percent of all nitrogen fertilizer sales in the United States. Of this amount, 50 percent is lost due to processes other than crop removal (Blackmer,1990).

However grim the statistics may be, Iowa has taken measures to begin to solve some of the problems facing its agricultural system. One such measure was the Iowa Groundwater Protection Act of 1987. This act of legislation led to the establishment of the Leopold Center for Sustainable Agriculture at Iowa State University. The mission of the Leopold Center is to identify and reduce adverse socioeconomic and environmental impacts of farming practices, create educational programs with the Cooperative Extension Service, and develop profitable farming systems that conserve natural resources (Iowa Groundwater Protection Act, 1987).

The Smith-Lever Act of 1914, which led to the establishment of a cooperative agricultural extension service, has perhaps made more of an impact on this nation's agricultural system than any other public organization in history (Knowles, 1980). The Cooperative Extension Service has adapted well to change in the past but it will have to continue to do so in the future or run the risk of losing its unique position of providing unbiased agricultural information and technical assistance to farmers. Evidence from a series of studies conducted in Iowa indicate that farmers are concerned about environmental problems associated with conventional agricultural practices and are vary

interested in alternative production systems (Lasley and Bultena, 1986).

Agricultural extension personnel must be constantly updated on new developments if information regarding sustainable agriculture is to reach and be of benefit to farmers. Information regarding sustainable agricultural practices must reach those in need and be communicated in an understandable and practical form to farmers, policy-makers, and the general public. Studies have shown that Iowa farmers receive substantial amounts of information from agricultural extension professionals (Ford and Babb, 1989; Alonge, 1990; Korsching and Malia, 1991). These professionals must possess adequate training and resources necessary to assist farmers in making value-based decisions regarding sustainable agriculture.

Purpose and Objectives

The purpose of this study was to identify and analyze the perceptions of county-level agricultural extension agents in Iowa regarding the need for additional training and informational needs in sustainable agriculture. A secondary purpose was to identify the implications of these perceptions to educational practice.

The specific objectives of this study were as follows:

1. To identify the level of importance to their work of selected topical items in sustainable agriculture as perceived by county-level agricultural extension professionals in Iowa.
2. To determine the present level of knowledge of county-level agricultural extension professionals regarding selected topical items in sustainable agriculture.
3. To identify training needs focused on sustainable agriculture of county-level agricultural extension professionals.
4. To identify the need for informational materials on selected topics in sustainable agriculture as perceived by county-level agricultural extension professionals.

Procedures

Research Design

The study adopted a descriptive survey design. This design was deemed appropriate given the exploratory nature of the data to be collected. Descriptive research is used to obtain information about the nature, incidence, or distribution of education variables and/or the relationships among these variables (Ary, Jacobs, and Razavieh, 1990).

Descriptive studies attempt to describe the situation as it exists at the time of the research.

Population

The target population for this study consisted of all county-level agricultural extension professionals in the Iowa State University Extension Service.

Since the target population for this study consisted of all agricultural extension professionals, it was possible to reach the entire population, no specific sampling technique was required. Subjects were indentified for participation through a current listing of all county-level agricultural extension personnel secured by the reseacher from the Iowa State Cooperative Extension personnel office. Ninety-one agricultural extension professionals qualified for this study.

Instrument Development

A mailed questionnaire was chosen by the researcher as the data collection instrument. Several questionnaires were examined from other studies of similar design to assist the researcher in developing a questionnaire best suited for this particular study. The instrument designed by the researcher focused on training and informational needs of county-level agricultural extension professionals regarding topical areas associated with sustainable agriculture. The selection of the topical areas in sustainable agriculture was based on a comprehensive review of the literature, experiences of the researcher, and suggestions from Iowa State University Extension and Soil Conservation Service personnel.

The questionnaire consisted of three sections. In section one, the respondents were asked to indicate their perceptions of the importance to their work and their present level of knowledge regarding forty-three topical areas associated with sustainable agriculture. In section two, the respondents were asked to indicate their perceptions of the need for additional training and informational materials in each of the forty-three items. Section three consisted of nine questions designed to obtain demographic information and other data from the repondents. In section one, respondents were asked to use a 5-point Likert-type scale (1-5) to indicate their perception of the importance of the topical areas to their work and their present level of knowledge. Descriptors of the scale were as follows: 1 = none, 2 = very little, 3 = some, 4 = moderate, and 5 = high.

Section two also used a 5-point Likert-type scale (1-5) to evaluate the response of the participants to questions regarding the need for additional training and need for informational materials in sustainable agriculture. Descriptors of the scale were as follows: 1 = strongly

disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

In order to establish content validity the instrument was reviewed by the researcher, major professor, four professors from the department of Agricultural Education and Studies, an associate director of the Leopold Center for Sustainable Agriculture, two State Resource Conservationists with the Soil Conservation Service, the Iowa State University Extension Coordinator for Practical Farmers of Iowa, an Iowa State University Extension Area Crops Specialist, and graduate students in the department of Agricultural Education and Studies.

Data Collection

Data collection was accomplished through the use of a mailed questionnaire. A cover letter was attached to the coded questionnaire, and a self-addressed prepaid return envelope was mailed to the participants. The letter explained the purpose and the need for the study and asked for the voluntary cooperation of the respondents.

The first mailing brought a response of 70 questionnaires. A follow-up post card was sent to the 21 non-respondents. A total of 83 questionnaires were returned, representing a response rate of 91 percent. Of the 83 returned questionnaires, 80 were usable, giving a usable response rate of 88 percent. The post-hoc reliability testing of the four-section data collection instrument yielded a reliability coefficient of 0.97.

Data Analysis

The data collected from the respondents were coded and entered into the Statistical Package for the Social Sciences (SPSS) computer program at the Iowa State University Computation Center. The following statistical procedures were used to analyze the data: FREQUENCIES subprogram was used to produce means, standard deviations, frequency counts, and percentages; post-hoc reliability test, one-way analysis of variance, t-test, multiple regression, and Pearson correlation coefficient analyses; and COMPUTE statements to formulate priority training and informational need scores. These statistical procedures were chosen for their appropriateness for the research objectives.

Results

The findings of the study as they relate to the stated objectives are discussed here. The discussion also includes a focus on the implications for agricultural and extension education programs.

Demographic Characteristics of the Respondents

The study found that the respondents were all male, highly educated, and well experienced in extension . The demographic information showed that most respondents (87.5%) were between the ages of 30 and 59 and had been employed by Iowa State University Extension between 10 and more than 30 years (62.5%). The results also indicated that the respondents were highly educated with most respondents (75%) having attained either a Master's or Doctoral Degree, a large number of respondents (43.8%) indicated the major area of study for their highest level of education was education. The majority of respondents (92.5%) indicated that, in addition to agriculture, they had at least one additional extension responsibility. The majority of the respondents (73.7%) also indicated having attended at least one workshop or conference related to sustainable agriculture. These findings seem to indicate that the respondents constitute a significant educational resource from which those involved in agriculture in Iowa can draw.

Importance of Topical Items in Sustainable Agriculture

One of the main objectives of this study was to identify the level of importance of selected topical items in sustainable agriculture as perceived by county-level agricultural extension professionals in Iowa. It was observed that fifteen of the topical items in sustainable agriculture received a rating of four or above. The next twenty-three topical items were rated between 3.09 and 3.91. The remaining five topical items in sustainable agriculture were rated between 2.29 and 2.99. The item "soil testing" received the highest rating on the importance scale while "sinkhole treatment" received the lowest rating. The findings suggest that the majority of the selected topical items in sustainable agriculture were deemed to be important be the respondents. As a group, the respondents rated thirty-eight of the items three or above, a rating of "some" or above in importance. The relatively low ratings of topical items such as "agroforestry" and "on-farm composting" may have been due to a lack of knowledge of and/or exposure to these topical areas in sustainable agriculture.

A Scheffe test, used with a one-way analysis of variance procedure, located several significant statistical differences between the respondents' perceived importance of the selected topical items in sustainable agriculture when grouped by the different demographic characteristics. The characteristic "age" showed that those between the ages of 40 and 49 years rated five topical items significantly higher than did the other age groups based on importance. The characteristic "years of experience" gave evidence that those with 20 or more years of experience rated the importance of several items significantly higher than did those with other amounts

of experience with Iowa State University Extension. Respondents with between 1 and 9 years of employment experience rated "on-farm research" significantly higher than did those with more substantial experience. This finding may be due to the recent emphasis regarding the concept of on-farm research in the state. The characteristic "level of education" found that those with a Bachelor's Degree rated two items significantly higher than did respondents with higher levels of education. The characteristic "major area of study" indicated those with a major area of study in crop production rated the importance of the item "field borders" significantly higher than with those with major areas of study in other disciplines. This finding may be due to their exposure to this topic while in school. Six topical items were found to have significant differences in their importance when respondents were grouped by the administrative area in which they worked. These findings indicate the diversity and area-specific nature of agriculture in Iowa.

The findings seem to validate the importance of the topical items in sustainable agriculture selected for this study. Although many significant differences were found and are quite interesting, they yield very little practical information to be used in planning educational programs for agricultural extension professionals in Iowa.

Knowledge of Respondents Regarding Sustainable Agriculture

Another important objective of this study was to determine the present level of knowledge of county-level agricultural extension professionals in Iowa regarding selected topical items in sustainable agriculture. It was observed that twelve of the topical items in sustainable agriculture received a rating of four or above. The next twenty-five items were rated between 3.00 and 3.95. The final six topical items in sustainable agriculture were rated between 2.05 and 2.98. As was reported in the importance to work scale, the item "soil testing" received the highest rating on the knowledge scale. The item with the lowest knowledge rating was "agroforestry." "Agroforestry" was also rated as the second least important topical item found on the survey. The findings indicate that county-level agricultural extension professionals in Iowa have at least some knowledge regarding the selected topical items in sustainable agriculture. As a group, the respondents rated thirty-seven of the items three or above, a rating of "some" or above in knowledge. The relatively low rating given to the topical item "agroforestry" seemed to indicate a lack of exposure on the part of the agricultural extension professional to this new agricultural innovation.

A Scheffé test located several significant statistical differences between the respondents' perceived present level of knowledge of the selected topical areas in sustainable

agriculture when grouped by different demographic characteristics. The characteristic "age" indicated that those 60 years of age and older reported a significantly higher level of knowledge than did the other age groups regarding the topical items "alternative crops" and "alternative livestock." The characteristic "years of experience" gave evidence that those with 30 or more years of experience with Iowa State University Extension rated their level of knowledge of the item "planting trees and shrubs" significantly higher than did groups with lesser amounts of work experience. This finding may be due to the land stewardship ethic which was still prevalent in agriculture some thirty years ago. The characteristic "level of education" found that those possessing a Doctoral Degree rated the item "tissue testing" significantly higher than did the other two groups with regards to their present level of knowledge. The characteristic "major area of study" indicated those with a major area of study in the social sciences rated their present level of knowledge of the items "alternative crops" and "on-farm composting" significantly lower than did the other groups. This may be due to their lack of exposure to these topics while in school. The characteristic "administrative area" showed that the item "sinkhole treatment" received a significantly higher present level of knowledge rating by those who worked in the East Central administrative area. "Pasture management" received a significantly higher knowledge rating by those who worked in the Southwest administrative area. This finding is probably due to the large number of cattle found in this geographical region of Iowa. The characteristic "additional extension duties" indicated those with three additional extension responsibilities besides agriculture rated their present level of knowledge of the items "tissue testing" and "the proper use and storage of agricultural chemicals" significantly higher than those with fewer extension responsibilities.

A t-test procedure was employed to identify any significant differences between respondents who had attended workshops or conferences in sustainable agriculture and those who had not attended workshops or conferences in sustainable agriculture regarding their perceived level of knowledge regarding selected topical items in sustainable agriculture. Respondents who had attended workshops or conferences in sustainable agriculture reported their present level of the items "on-farm research" and "energy conservation" significantly higher than those who had not attended workshops or conferences in sustainable agriculture. This finding may be due to the recent emphasis of "on-farm research" at sustainable agriculture workshops and conferences.

The findings related to the present level of knowledge of the respondents regarding selected topical items in sustainable agriculture give evidence to support that the respondents were somewhat familiar with the topical items.

Respondents were clearly more knowledgeable regarding some items as opposed to others. This finding may be due in part to the respondents' lack of exposure and/or the lack of relevance to their work.

Training Needs of Respondents in Sustainable Agriculture

One of the primary objectives of this study was to identify the training needs focused on sustainable agriculture of county-level agricultural extension professionals in Iowa. The training needs of the respondents were calculated in two ways: raw scores and weighted priority scores. The raw scores indicated that only three of the topical items in sustainable agriculture received a rating of four or above. The next thirty-four topical items were rated between 3.15 and 3.92. The remaining six items were rated between 2.53 and 2.95. The item "economic analysis of sustainable agricultural systems" received the highest rating for training needs while "sinkhole treatment" received the lowest rating. The findings seem to suggest that the respondents perceive the need for training in only three of the topical items. The findings also suggest that, due to the large number of items which were rated between 3.15 and 3.92, the respondents were either unsure of their own training needs or that the respondents were not familiar with the topical items.

The one-way analysis of variance procedure, along with a Scheffe test, was used to identify any significant statistical differences which existed regarding the respondents perceived need for training in topical items in sustainable agriculture when grouped by demographic characteristics. The characteristic "age" showed that those between the ages of 40 and 49 years rated their need for training in five items significantly higher than did those in other age groups. The characteristic "years of experience" gave evidence that those with 10 to 19 years of experience rated their need for training in several items significantly lower than did those with different amounts of experience with Iowa State University Extension. However, it must be noted that the highest need for training scores, when respondents were grouped by their years of experience with extension, were neutral at best. The characteristic "level of education" indicated that those possessing a Doctoral Degree reported a significantly lower need for training regarding the item "on-farm research." This finding may be due to the research nature of their degree. The characteristic "administrative area" indicated that respondents who worked in the East Central geographical area reported a significantly higher need for training in the items "pasture management" and "intensive short-duration grazing." A t-test indicated that those who had not attended workshops or conferences in sustainable agriculture perceived a significantly higher need for training related to the items

"alternative crops", "economic analysis of sustainable agricultural systems', "surface water contamination", "proper use and storage of agricultural chemicals", and "manure management" than those who had attended workshops or conferences in sustainable agriculture.

A weighted score was calculated to determine the priority training needs of county-level agricultural extension professionals in Iowa. This method was used to formulate a training needs score for each of the selected items in sustainable agriculture based upon the importance to work scores and present level of knowledge scores of the respondents. This method of prioritizing training needs yielded findings somewhat similar in nature to the raw training need scores. The item which was rated as having the highest priority for training was "economic analysis of sustainable agricultural systems." The item which was ranked as the lowest priority for training was "planting trees and shrubs."

Need for Informational Materials in Sustainable Agriculture

Findings of this study related to the need for informational materials in sustainable agriculture seem to be linked quite closely with the perceived training needs of the respondents. Overall, the raw informational need scores indicate that informational material is needed regarding the item "economic analysis of sustainable agricultural systems." Seven of the topical items in sustainable agriculture received a rating of four or above. The next thirty-four topical items were rated between 3.10 and 3.91. The remaining two topical items in sustainable agriculture, "sinkhole treatment" and "agroforestry," received ratings of 2.61 and 2.89, respectively. Perhaps this finding suggests that the issue of "sinkhole treatment" is well at hand. "Agroforestry", on the other hand, is a promising recent innovation in agriculture and it could be quite possible that county-level agricultural extension professionals are not aware of its potential in Iowa. The demographic characteristic "age" indicated that those 40 to 49 years of age rated the need for informational materials significantly higher than did other age groups in regards to several items. The characteristic "level of education" found that those with Doctoral Degree's rated the need for information about "on-farm research" significantly lower than did those with either a Bachelor's Degree or a Master's Degree. The characteristic "administrative area" again found several significant differences to exist among the seven Iowa State University Extension administrative areas regarding the need for informational materials. This finding solidifies the diverse and site-specific needs of even a homogeneous agricultural state such as Iowa. When combined with the importance to work scores and present level of knowledge scores, the weighted priority informational need scores indicated a

strong need for informational materials dealing with the "economic analysis of sustainable agricultural systems." The lowest ranked priority for informational materials relating to sustainable agriculture are those materials having to do with "sinkhole treatment."

Educational Implications of the Findings of the Study

The overall goal of this study was to be able to draw implications for agricultural and extension education programs with regards to sustainable agriculture. The findings of this study indicate that the county-level agricultural extension personnel in Iowa represent a formidable educational resource for those involved with agricultural production in Iowa. As a group, they are highly educated and experienced in extension. When the respondents were grouped by several demographic variables, several statistically significant differences were located. The only practical information gained from these significant differences was when the respondents were grouped by administrative area. It was this information which showed the diverse and site-specific agricultural needs of Iowa. This information could be quite useful for planning area-specific educational programs for agricultural extension personnel.

The findings indicate a strong need for both educational programs and informational materials in the economic assessment of sustainable agricultural systems. Other items having high priority training and information needs were: tillage systems, residue management, on-farm research, manure management, and rotational grazing. The bottom-line, according to the comments of the respondents is that people are involved in farming to make a profit. They will only make changes in their current practices when they are able to clearly see a benefit to themselves or, more recently, to the environment. It is imperative that county-level agricultural extension professionals have the necessary training and informational materials to help farmers make unbiased, value-based decisions regarding the future of a sustainable agriculture in Iowa.

While there is no doubt that county-level agricultural extension professionals perceived their educational needs to be strong in several of the selected areas in sustainable agriculture, it is necessary to also examine how the respondents came to select the particular areas for which they felt they lacked adequate knowledge. Were those needs selected on the basis of a self-perceived need of the respondent or were those needs based on an analysis of site-specific community needs? Do county-level agricultural extension professionals have adequate educational preparation to conduct a community agricultural needs analysis? If not, it is imperative that they be familiarized with the needs analysis and program planning process. The criteria used for

the selection of new county-level agricultural extension professionals should include the knowledge of not only these processes but also an in-depth knowledge of educational delivery and adult learning methodologies, as well as the technical knowledge in sustainable agriculture which will be required by law in 1995.

The study has given evidence that there are many site-specific agricultural needs in Iowa and that a "canned" program passed down from the top will not satisfy the needs of the more highly educated clientele that are available to Extension. County-level agricultural extension professionals should be facilitators of local change and not messengers of a homogeneous agricultural agenda set from the top administrative level. Extension professionals are educators and need to be skilled facilitators of education and managers of information.

Conclusions and Recommendations

Conclusions

1. These findings again verify that the respondents constitute a significant educational resource from which those involved in agriculture in Iowa can draw.
2. The majority of respondents were in agreement with the importance to their work of the topical items in sustainable agriculture.
3. Iowa State University Extension needs to strengthen their efforts in providing county-level agricultural extension professionals with training and informational materials regarding the agronomic and economic aspects of sustainable agriculture.
4. The variety of responses and comments seems to indicate that there are concerns about policy directions regarding sustainable agriculture within the Iowa State University Extension Service.

Recommendations

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

1. The results of this study should be shared with the agriculture administrators of Iowa State University Extension and with other individuals responsible for planning in-service educational programs for agricultural extension personnel.
2. Iowa State University Extension needs to develop a clear policy statement pertaining to helping farmers achieve agricultural sustainability in Iowa.

3. A workshop in sustainable agriculture should be conducted for all county-level agricultural extension professionals in Iowa to become more aware of the issue of agricultural sustainability.
4. Educational programs focusing on the economic analysis of sustainable agricultural systems, tillage systems, residue management, on-farm research, manure management, and rotational grazing, should be planned for and delivered to county-level agricultural extension professionals in Iowa.

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PERCEPTIONS OF COUNTY-LEVEL EXTENSION PROFESSIONALS REGARDING TRAINING AND INFORMATIONAL NEEDS IN SUSTAINABLE AGRICULTURE

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Training and informational needs of extension personnel is always a timely topic. Linking that concern with a hot topic like sustainable agriculture doubles the potential impact of the study. The literature review and theoretical construct for the study, although brief, serve as an excellent lead to the problem statement, purpose and objectives. The importance of the topic for agricultural educators is apparent.

The procedures section is generally well-written. There is some confusion in the area of instrument development, due to the flip-flop among discussions of the three sections of the instrument. This does not aid the reader in the data collection section, where reliability of the four-section instrument is mentioned. Continuing with reliability, it is not clear whether there is one construct or three (or four) within the instrument. Obviously, that has important implications for reliability, which was reported as one coefficient for the entire instrument. For validity of the instrument, the researchers called upon an array of experts. Assumptions were made that at least some of these experts have expertise related to the instrument. More information would help identify that perceived expertise.

This study may suffer from data analysis overload. Finding the need for t-tests and ANOVA, based on the objectives, is difficult. During the discussion of the findings, a new aspect of the study is revealed, namely, differences between attendees and non-attendees. Also, findings related to differences between groups arranged by demographic characteristics was introduced. There was no basis for this line of analysis in the introduction to the study.

Perhaps a more appropriate approach would have been simply to report the importance and knowledge ratings, and then present the training needs argument, since this seems to be the major thrust of the study. By the way, a more complete explanation of the weighted score computation would have been helpful. These rated scores, when ranked, should indicate a relative need for the items on the instrument. I refer the authors to the work of Gary Borich in the 1980s relative to rank-order needs assessment studies. The informational materials section of the findings could be handled in the same manner.

Implications, conclusions and recommendations, when taking into account the above comments, are appropriate and lead the reader to understand how the findings may have an impact on what it is that departments of agricultural education could do to address the problem. Specific recommendations, as presented in this paper, are always preferable to the general statements we often read.

DISTRICT FINANCIAL ABILITY AND EFFORT AMONG CLASSES OF SCHOOL LOCATION IN OHIO PUBLIC SCHOOLS

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Introduction

In its origin, agricultural education in the United States served rural communities (True, 1929). In recent years agricultural education has sought to provide relevant education for a wider range of clientele (NRC, 1988). However, research (Baker, 1990) has shown that a majority of rural school districts in have agricultural education programs. It is logical for the discipline of agricultural education, then, to conduct research about rural schooling.

There are a series of trends affecting rural schools in the United States (Stephens, 1992). The first of these trends is a reduced federal government presence, and a corresponding reduction in federal revenue sharing for state and local governments. Second, population density continues to increase around metropolitan areas (U. S. Bureau of Census, 1991). This has resulted in a shift in the alignment of political power, both at the federal state level. In turn, the fiscal pressures upon rural local governments have increased. Rural communities have had to bear more of the financial burden of maintaining their infrastructure. Not surprisingly, rural school districts are facing increasing competition for local tax revenues (Baker, 1990 & Harl, 1985).

As rural areas face increasing financial responsibility for their schools, roads, and municipal services, these areas are going to be negatively affected in terms of their ability to provide resources for public education (Stephens, 1992). Bass and Verstagen (1992) conducted a national survey of state educational funding policies and found vast differences in the way that states equalize for factors related to a school's geography and enrollment level.

Research (Peasley & McCracken, 1992; Coleman, 1966) has shown that school district financial ability, as measured by family socioeconomic status, is the largest predictor of student achievement. Peasley and McCracken (1992) have further shown that school district financial effort, as measured by rates of taxation and per-pupil expenditure, is the second largest predictor of student achievement in Ohio public schools. It is important to further examine district financial effort and ability among classes of school location so that policy makers can make informed decisions about resource allocation.

Research in Ohio has studied rural schools in terms of student aspirations (McCracken, Wims, & Barcinas, 1991; McCracken & Odell, 1989), voter behavior (Baker, 1990), curriculum (Elliot & McCracken, 1989), achievement (Peasley & McCracken, 1992; Peasley, Baker, & McCracken, 1991; Baker, 1990); and school expenditure patterns (Peasley, Baker, & McCracken, 1991; Peasley & McCracken, 1992). Peasley, Baker, and McCracken (1991) found differences in financial ability and the financial effort within rural schools. Peasley and McCracken (1992) recommended research that would further compare the financial ability and effort among

classes of school location (rural, suburban, urban) in Ohio.

Purpose and Objectives

The purpose of this study was to examine the financial ability and financial effort among classes of school location in Ohio public schools. The following objective guided the study:

1. To describe Ohio school districts in terms of school district financial ability and financial effort among the classes of school location.

Procedures

The study was descriptive in nature. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were collected from records compiled by the Ohio Departments of Education and Taxation in April, 1991. Measures of school district financial ability included: average and median family income, the percentage of families receiving aid to dependent children (ADC), the percentage of students receiving free and reduced lunch, total property valuation/pupil, and agricultural and residential property valuation/pupil.

Measures of school district financial effort included: agricultural and residential property tax rate, current school operating expenditures tax rate, total property taxes/pupil, % of total district funding from local revenues, total expenditure/pupil, average teacher salary, instructional expenditure/pupil, and non-instructional expenditure/pupil. School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the objective.

Schools were classified into one of five location categories based upon 1990 U. S. Census data as follows: **rural** schools (N=69) were those schools located in counties that had a population less than 40,000 and were not contiguous to a Metropolitan Statistical Area (MSA); **semi-rural** (N=101) schools were located in counties with a population greater than 40,000 and were not contiguous to a MSA; **rural/suburban** schools (N=45) were located in counties with a population less than 40,000 and were contiguous to a MSA; **suburban** (N=185) schools were located in counties with a population greater than 40,000 and were contiguous to a MSA; and **urban** schools (N=202) were located in counties classified as a MSA.

Results

The measures of financial ability are summarized in Table 1. An examination of this summary shows large differences in every measure of financial ability. Urban schools in Ohio have the highest level of median family income, while rural districts have the lowest. Semi-rural and rural communities have the highest percentage of students receiving ADC. Rural and semi-rural districts also have the highest percentage of students receiving free lunch. The rural/suburban and suburban class of schools had similar levels of income, ADC percentage, and free lunch

Table 1: Means, Standard Deviations, and Medians of Selected Measures of Financial Ability of Ohio Public School Districts By School Location, 1990 (N=612).

Measure		Rural N=69	Semi-Rural N=101	Rural/ Suburban N=45	Suburban N=185	Urban N=202
Income	Mean	$19,839	$20,569	$21,459	$22,323	$24,259
	S.D	$2,405	$2,519	$1,982	$3,373	$4,980
	Median	$19,327	$20,337	$21,419	$21,697	$23,405
%ADC	Mean	12.96	13.84	5.08	7.21	8.75
	S. D.	8.59	9.92	3.47	5.48	10.49
	Median	10.00	12.00	5.00	5.00	4.00
%FLun.	Mean	19.0	18.8	10.1	11.4	12.0
	S. D.	10.8	11.3	5.6	6.6	12.2
	Median	17.8	17.1	10.1	10.7	7.4
%RLun.	Mean	3.9	4.1	3.9	3.2	3.1
	S. D.	1.5	4.6	4.9	1.4	1.8
	Median	3.9	3.5	3.3	3.1	2.9
ProVal	Mean	$43,445	$48,387	$46,770	$64,502	$78,892
	S. D.	$14,183	$19,594	$16,296	$89,682	$53,791
	Median	$41,544	$44,502	$43,987	$48,467	$52,861
AgResV	Mean	$24,197	$25,578	$30,141	$37,041	$43,364
	S. D.	$5,520	$7,502	$6,330	$43,431	$25,515
	Median	$24,602	$24,958	$28,829	$30,017	$34,426

Note: Income=median family income; %ADC=percentage of families receiving ADC; %FLun.=number of students receiving free lunch; %RLun.=% of students receiving reduced lunch; ProVal=per-pupil property valuation; AgResV=per-pupil agricultural and residential property valuation.

percentage. The rates of students receiving reduced lunch was fairly equivalent across all classes of schools.

Rural districts had the lowest level of per-pupil property and agricultural-residential property valuation. Urban districts had the overall highest levels of per-pupil property and agricultural-residential property valuation. Rural/suburban schools were similar rural and semi-rural schools in terms of property valuation, while suburban schools were more similar to urban schools with respect to these measures.

A summary of the measures of district financial effort appears in Table 2. Once again, there are meaningful differences in nearly every measure of school district financial effort. Urban, rural/suburban, and suburban schools have nearly equal rates of agricultural-residential millage. Rural and semi-rural districts have the lowest levels of agricultural-residential millage. Urban and suburban schools have the highest overall level of operating millage rates, while rural/suburban, semi-rural, and rural schools have similarly low operating millage rates.

Correspondingly, urban suburban schools have the highest levels of tax dollars raised/pupil, total expenditure/pupil, teacher salary, and instructional expenditure/pupil. Rural schools and semi-rural schools

Table 2: Means, Standard Deviations, and Medians of Selected Measures of Financial Effort of Ohio Public School Districts By School Location, 1990 (N=612).

Measure		Rural N=69	Semi-Rural N=101	Rural/ Suburban N=45	Suburban N=185	Urban N=202
AgReMil	Mean	24.74	24.91	28.77	27.75	30.37
	S.D	4.34	3.84	5.30	4.36	5.22
	Median	22	23	27	27	29
COpMil	Mean	31.71	33.36	34.07	40.52	44.83
	S. D.	7.54	5.60	6.71	8.61	11.21
	Median	30	33	32	39	42
TaxPup	Mean	$1,168	$1,342	$1,376	$1,975	$2,584
	S. D.	$454	$587	$462	$2,727	$1,513
	Median	$1,067	$1,270	$1,269	$1,527	$2,075
%Local	Mean	35.11	38.96	41.25	45.32	54.71
	S. D.	11.27	14.92	10.42	14.45	17.83
	Median	33	37	39	43	51
ExpPup	Mean	$3,691	$3,745	$3,694	$4,242	$4,544
	S. D.	$314	$328	$378	$3,188	$1,043
	Median	$3,664	$3,736	$3,586	$3,850	$4,261
TeSal	Mean	$26,031	$26,939	$26,266	$28,181	$31,510
	S. D.	$1,755	$2,029	$2,259	$2,924	$3,366
	Median	$26,214	$27,021	$25,799	$27,985	$31,448
InExPu	Mean	$1,552	$1,629	$1,627	$1,877	$2,083
	S. D.	$175	$168	$178	$1,224	$487
	Median	1,553	$1,604	$1,608	$1,690	$1,959
NIExPu	Mean	$59	$59	$70	$68	$82
	S. D.	$34	$33	$48	$43	$59
	Median	$56	$55	$64	$62	$66

Note: AgReMil=agricultural and residential property millage rate; COpMil=current operating millage rate; TaxPup=per-pupil property taxes; %Local=percentage of total school district budget funded from local sources; ExpPup=per-pupil total expenditure; TeSal=average teacher salary; InExPu=per-pupil instructional expenditure; NIExPu=per-pupil non-instructional expenditure.

have the lowest levels of these measures. Urban districts have the highest level of local percentage of total educational expenditure. Urban and suburban schools have the ability to raise more funds for education, and expend more effort to generate financial resources. Rural/suburban schools appear to be more like rural and semi-rural schools in terms of financial effort.

Conclusions and Recommendations

There are differences in every measure of financial ability among school districts based upon school location in Ohio. Urban and suburban districts have a greater capacity to generate revenue for local schooling than do rural, semi-rural, and rural/suburban districts. Urban and suburban schools also expend more financial effort to support

schools than do rural, semi-rural, and rural/suburban schools. Generally, urban and suburban schools in Ohio have more per-pupil wealth and spend more money on a per-pupil basis than do rural, semi-rural, and rural/suburban schools. These findings support the contention of Stephens (1992) that rural schools are at a distinct fiscal disadvantage. As long as significant differences exist in economic wealth between school districts, fiscally poor communities will continue to hard pressed to fund schooling as well as those districts which are wealthier.

Leaders of Ohio rural school districts should continue to study ways of maximizing the funds that can be raised for public schooling to guarantee the most efficient use of scarce resources. Ohio rural school leaders should maintain an active voice in the state-wide educational policy making process. Rural school researchers should continue to research patterns of expenditure and taxation in Ohio public schools within classes of school location, in an effort to identify differences in how schools spend resources. Legal redress of educational funding inequities may be a viable option for districts in inequitable situations.

Ohio agricultural education teachers are often responsible for planning educational programs in their schools. Since agricultural education programs in Ohio are often in rural locations (Baker, 1990), teachers of these programs need a high level of awareness of the fiscal realities of their school district. These findings, as well as other policy studies of rural schools should be included in the program planning component of the teacher ducation curriculum of Ohio agricultural educators.

On interesting finding of this study is that of the rural/suburban class of schools. This class of schools appears to have similarities with both rural schools and urban schools, depending upon which characteristic (i.e., financial effort or financial ability) is examined. When this finding is put in the context of research on the high achievement of semi-rural schools (Peasley & McCracken, 1992), it can be argued that semi-rural schools do more with less than any other class of schools in Ohio. Further, in depth research into this unique class of school districts is warranted in Ohio.

Finally, the results of this study are specific to the state of Ohio. A broader, multi-state research effort of rural schools would afford a better "picture" of the rural schooling experience in the United States.

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PREDICTORS OF ADULT VOCATIONAL STUDENT RETENTION

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Introduction

"A strong back, the willingness to work, and a high school diploma were once all that was needed to make a start in America" (U.S. Dept. of Labor, 1991, p.1). That is no longer true. Work is changing, and the students of yesterday - today's adult workforce - may not be able to survive in the world of work with their present skills and abilities. High performance workplaces become a model for success in the future. "...work is problem-oriented, flexible, and organized in teams; labor is not a cost but an investment" (U.S. Dept. of Labor, 1991, p.3). These new high performance workplaces demand a better educated, better skilled worker.

This changing workplace has increased the importance of "second-chance" training in America. This "second-chance" training predominately assists those who are high school dropouts, unemployed, underemployed, working poor, dislocated workers, and displaced homemakers (Carnevale, 1989). By some definitions the participants in "second-chance" learning are labeled "nontraditional" learners. But, whatever they are called, they are in need - in need of the opportunities that education can provide.

Throughout most of the 20th century there appeared to be an overabundance of American workers; however, by the year 2000 there are likely to be too few well-trained workers to satisfy the nation's economic needs (Carnevale, 1989). The labor force is projected to increase at an annual rate significantly lower than the labor force growth rate of the past two decades (Mangum, 1990). The U.S. Department of Labor (1992) anticipates that 80 percent of the workforce for the year 2000 are already in the workforce, and the number of students who will be entering the workforce is not enough to provide for a competitive America in the next decade. Workers will change jobs several times over their work life. This change will bring about the necessity of new skill development, increased knowledge, and improved ability in decision making and critical thinking.

Meeting the special needs and interests of various adult groups becomes the ultimate challenge to educational providers. This challenge becomes magnified with the projection that 80% of the new entrants into the workforce will be women, minorities and immigrants, while the remainder of the workforce will represent an aging group of adult workers (Naisbitt, 1990).

The President is challenging Americans to "go back to school" and make this a "nation of students" (U.S. Dept. of Education, 1991). But the duration of time spent in a training program must be long enough to acquire a skill well enough to secure employment or increase competency levels to meet the increased job demands. Some students drop out of their training before acquiring sufficient skills for advancement or the

procurement of work. Insufficient attention has been directed to the difficulties many of these nontraditional students experience in attempting to complete a vocational training program. A better understanding of this population will assist vocational educators and planners in providing the proper environment to meet the special needs of this adult population and thereby increase the chances for program completion.

Adult vocational education is essential to all who seek it, but completion of the training program becomes vitally crucial to the fulfillment of the ultimate goal of employability. Believing and understanding the need for participation in these programs is not the problem. The problem lies in keeping students long enough to teach them skills well enough for them to garner employment, keep employment, or advance on the job.

Adults are becoming the nation's most important student population (Barth, 1992). And preparing adults for employment has always been, and will continue to be, an important mission for vocational education. However, understanding attrition and retention can help determine ways of facilitating student learning and completing the goals leading to employability.

Dropout from adult vocational education is a serious problem because it entails costs not only to individual dropouts, but to adult education agencies, organizations and society. For the individual, dropping out means failure to achieve an educational goal, wasted time and energy, and perhaps feelings of anger, frustration, or personal inadequacy. If the dropout behavior is associated with displeasure in the learning process, it may precipitate negative feelings toward adult education and hinder further participation in education in the future (Darkenwald, 1981).

According to available research, dropouts will, relative to those who complete, earn less money, suffer more unemployment, have more health problems, and are more dissatisfied with their personal lives. But this tragedy doesn't just affect the individual. The nation loses in foregone earnings and taxes; more is spent for crime control, welfare, health care, and other social services that unproductive citizens require. When students drop out we all lose (Kennedy, 1988).

Background and Setting

There are several educational learning opportunities for adults in the State of Ohio. One of those adult opportunities is delivered through the Division of Vocational and Career Education within the Ohio Department of Education. That delivery system for adults is full-time, occupationally specific vocational training programs which are administered through one of two types of schools systems in Ohio: joint vocational school districts or city school districts. The programs offered are job specific and categorized under the four service areas of the Division of Vocational and Career Education: (1) Agriculture, (2) Business/Marketing, (3) Home Economics, and (4) Trade and Industrial. There are approximately 534 of these programs serving persons who have completed or left high school and

who wish to train for occupations best learned in programs of approximately eight to twelve months in length.

Statement of the Problem

To date, little is known about the full-time adult vocational student seeking job-specific training. Statistics from the Ohio Division of Vocational and Career Education show that approximately 8,000 adults are served through this method of vocational education, but little demographic information has ever been collected which would allow an insight into the problems, concerns, and needs of these students. An even more serious omission of data is the number of students who leave these programs without completing their occupational training or securing a job in the area of training for which they were enrolled. Why do these students leave? Are they employed? Could they have been retained?

Purpose of the Study

The purposes of this study were (1) to describe the nontraditional adult students (N=8010 students) attending full-time, occupationally specific vocational training programs (N=534 programs) in the state of Ohio, and (2) to develop a dropout prediction model of enrolled students using sets of independent variables adapted and revised from the *Conceptual Model of Nontraditional Student Attrition and Persistence in Postsecondary Vocational Education Programs* developed by Johnson (1991).

Theoretical Construct

Johnson (1991), in an extensive review of vocational postsecondary attrition, found that major contributions to the understanding of student attrition in postsecondary education evolved from two-year and four-year college and university settings. Generalizing these findings to vocational education settings becomes problematic. Not only do the nontraditional adult students differ in their goals, background, characteristics, and achievement levels, their education orientation is toward job-specific training and not general education or college preparatory. Further, postsecondary vocational training is usually shorter in length than the two- or four- year institutions used most often in postsecondary attrition studies. Therefore, the differences in socio-demographics, education orientation, and program length coupled with the fact that most of the students attending postsecondary vocational training are nontraditional students, the need for a model specific to the characteristics and backgrounds of this population is necessary. Johnson (1991) has attempted to construct such a model, a portion of which was utilized in this study with some minor revisions.

In the Johnson Proposed Conceptual Model there were four proposed sets of independent variables labeled Intrinsic and Extrinsic Motivation Factors with subsets of variables under each category. Through an intense content analysis these variables were condensed into the sets of independent variables shown in Figure 1 and were used as shown for testing in this study. The four categories of variable sets in the revised model represented four constructs which were comprised of the independent variables listed under each of the headings. All variables listed under

the headings became separate independent variables used in testing for significance and determining inclusion in a discriminant analysis procedure.

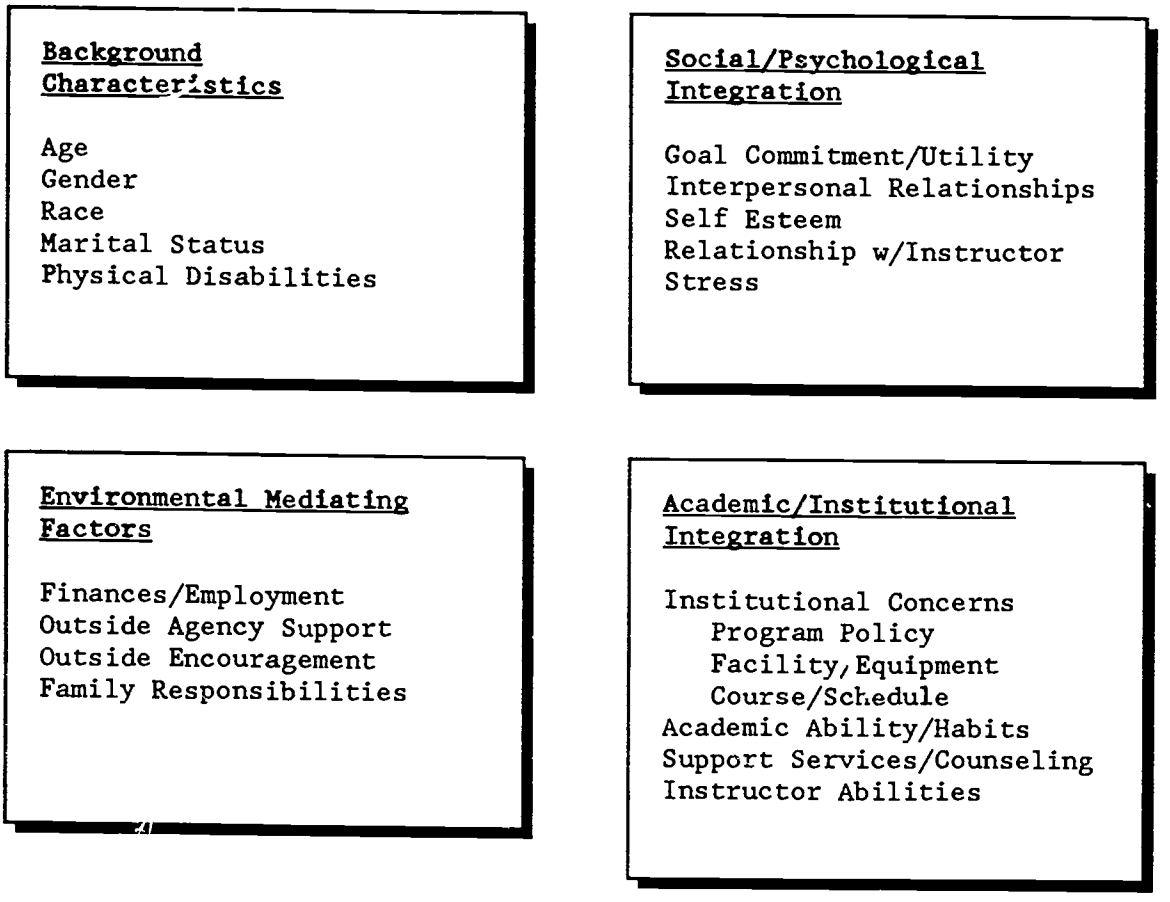

Figure 1. Revised model comprising the independent variables sets used for testing student dropout/completion in adult vocational, job specific training programs in the state of Ohio.

Research Objectives

The study was guided by the following research objectives and hypotheses.

1. To determine a demographic profile of the type of student enrolled in a full-time, occupationally specific adult vocational training program.

2. To determine retention and attrition rates that can serve as a baseline for monitoring the effects of subsequent institutional or program changes.

3. To develop a prediction model to identify students who are potential dropouts.

Population

The target population was full-time, occupationally specific adult vocational education students in Ohio. Based upon the information provided by the Ohio Division of Vocational and Career Education, there were 534 training programs in Ohio in FY91. With an average of 15 students in each program, training opportunities were provided for approximately 8,010 students in 1991. The total enrollment numbers for fiscal year 1991 were used with confidence as no new program could be added to any school system because of reduced funding resources by the State Division of Vocational and Career Education.

After a random selection of programs was made, all students in the selected programs became the sample for the investigation. The number of programs needed for the cluster sample was determined by using the Krejcie and Morgan Table for Estimating Sample Size of a Given Population (Krejcie & Morgan, 1970). This table is based on 95% level of confidence and a 5% sampling error.

The cluster sample of programs was drawn on September 8, 1991, which was when most of the full-time programs began in Ohio. From the list of programs a directory of enrolled students was compiled by mailing a packet of information-gathering forms to all adult vocational directors of school from which the programs were selected.

As non-response was an anticipated problem, and because all schools do not keep accurate student information, the information-gathering forms also collected pertinent demographic and background information found in the literature to be variables which may affect dropout and retention. This information was used for follow-up purposes of non-respondents by comparing respondents and non-respondents on known characteristics. The information-gathering forms were reviewed by a panel of experts and found to be valid for its intended purpose.

Instrumentation

Data were collected from a survey instrument developed by the investigator. It was designed to measure each independent variable within each of the four constructs shown in Figure 1.

After the instrument was designed, it was submitted to a panel of experts for the purpose of establishing content validity. The instrument was then field tested for content and face validity by full-time, occupationally specific adult vocational program students enrolled in a program which was not randomly selected for participation in the initial study. The revised instrument was pilot tested for reliability to ensure internal consistency by performing a Cronbach's Alpha on each set of five items comprising the fifteen independent variables. The alphas ranged from .60 to .96. To ensure consistency over time a Test/Retest strategy was utilized by administering the instrument to the same group of student two times (one week apart). The results were compared for agreement using a Pearson's. The pilot test was conducted by a group of students enrolled or dropped out of a full-time occupationally specific adult vocational

training program not drawn in the random selection. Results of the test/retest procedure ranged from .50 to .93.

Data Collection

The survey instrument with accompanying cover letter and an incentive item (a one dollar bill) was mailed to participants (n=376). A reminder/thank you postal card was mailed to all participants (n=376) seven days after mailing the initial packet. A second complete packet was mailed to non-respondents (n=214) seven days after the first follow-up postal card. A third full packet was mailed to the remaining nonrespondents (n=121). The entire data collection process was completed within six weeks and produced a 74% response rate (n=278).

Non-respondents were controlled for by drawing a random sample of ten percent of the final non-respondents and contacting them by phone for an interview requesting responses to the questionnaire. Those non-respondents were compared with respondents on randomly selected variables. As there was no significant difference, non-respondents were presumed to resemble respondents, thereby permitting generalization to the target population.

Further, non-respondents' known characteristics (as determined by the information-gathering form completed by each student upon enrolling in the program) were compared to respondents' known characteristics as suggested by Miller and Smith (1983). As no significant differences were found, this procedure further established validity to the process of generalizing to the target population.

To verify the accuracy of students' self-reported completion status, all teachers were contacted. The percent of agreement between teachers' reports and students' reports was 93%. The small discrepancy was postulated to reflect (1) the interpretation of whether or not those who left for employment reasons received employment in the area for which they were receiving training, and (2) those who obtained their desired skill level believed they completed.

Data Analysis

The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+). Descriptive statistics were used to organize, summarize, and analyze the differences between groups. Point biserial correlations were used to determine the variables for inclusion in the discriminant analysis procedure. Stepwise discriminant analysis was used to determine the best predictor(s) of the dependent variable, "dropout" or "completer". The data were checked for normal distribution and equal group covariance (Box's M test) to adhere to the assumptions of discriminant analysis.

Results

The results of the discriminant analysis procedure indicated that eight variables were the most significant in predicting dropout and completion in adult vocational job specific training programs in the state of Ohio:

Course/Schedule, Finances/ Employment, Outside Agency Support, Instructor Abilities, Physical Disability, Interpersonal Relationships, Academic Ability/Habits, and Family Responsibilities.

In relation to the variable sets proposed by the Johnson Model (1991) and also in accordance with the Bean and Metzner Model (1985) all four variable sets remain in this prediction model; however, their composition has changed greatly. As shown in Figure 2, Background Characteristics contains only the variable Physical Disabilities. This variable was determined to be associated with students who dropped out of their training programs.

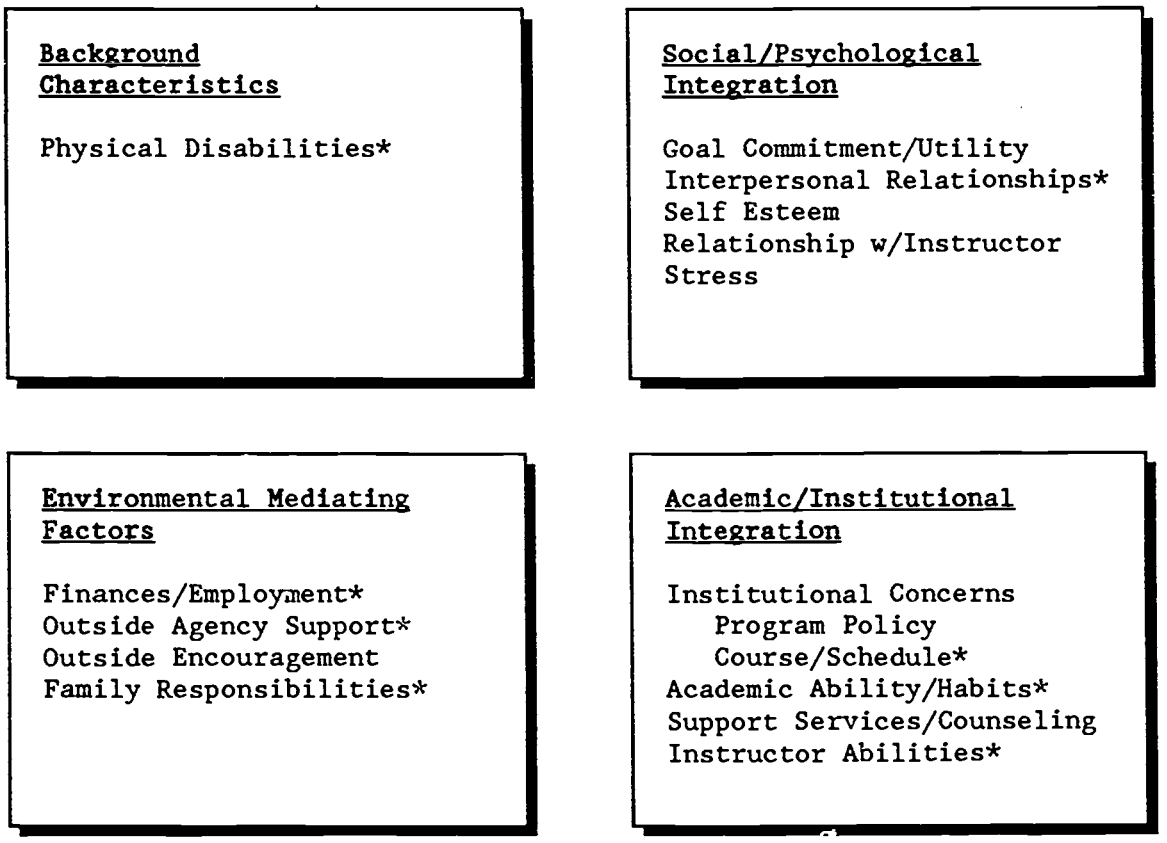

Figure 2. Independent variables found to have a significant association with dropout and completion among adult students in full-time, job specific vocational training programs. The asterisk denotes those found to be discriminating in the prediction model.

The variable set Social/Psychological Integration also contains only one variable that is significantly related to completion of training programs, Interpersonal Relationships. The variable set, Environmental Mediating Factors, proved to be one of the two most discriminating sets of variables between dropouts and completers. Remaining in this variable set after testing were Finances/Employment and Family Responsibilities, both of which were associated with students who dropped out, and Outside Agency Support, which was correlated with students who completed.

The other most discriminating set of variables was Academic/Institutional Integration. The most distinguishing variable (as shown by the highest standardized discriminant function coefficient) was Course/Schedule. This variable was correlated with completion, which would indicate the importance of placing students in their area of interest and ability. Also in this variable set was Academic Ability/ Habits, which followed true to form with the many research studies involving attrition: students' grades and abilities matter significantly in persistence to complete. The other variable found to be distinguishing between dropouts and completers was Instructor Abilities. Completion was more evident among those students who felt the instructor used methodology which was helpful to their learning, cared about their progress, and demonstrated acceptable ability and style of teaching.

Using the variables shown in Figure 2, 22% of the variance between dropouts and completers could be explained. Also, from this revised model, 76% of the cases were correctly classified (75% of the completers and 79% of the dropouts).

Compiled Student Profile

It is not the intent to infer any type of causation with the following scenario, but only to fabricate an imaginable portrayal of the average student in a vocational, job specific training program in Ohio. It must be remembered that "cause" cannot be inferred from a correlational study and that only an association can be shown.

From the data collected it appeared that adult students attending full-time, occupationally specific training programs in Ohio are predominantly white women approximately 35 years of age with about a 2-out-of-3 chance of being married. She is probably receiving outside agency support (from a Pell grant or funding from JTPA) to attend the training program. She is probably unemployed and has a one-in-three chance of being on welfare. Before entering the program she was an hourly wage earner with a high school diploma or less living on a total household income of under $10,000. Her main reason for enrolling is to learn new job skills for employment. She has a 17% chance of dropping out of the program before completion, and if she does, she will attribute it to having too many responsibilities; not enough money; unable to work and go to school at the same time; dissatisfied with the quality of teaching; and not having liked the instructor. Also, if she drops out there is a 29% chance that she has a physical disability.

If finances and employment cause her great worry, along with abundant family responsibilities, she will probably drop out. That chance is even greater if she has a physical disability.

If she does complete, it will be attributable to attending a course that was interesting and relevant to her needs and was offered at a time convenient to her schedule. She was able to obtain outside agency support in an amount adequate for her economic condition, and she was able to develop friends and have some social contact while attending the program. Prior to enrollment she experienced some success with previous educational experiences because of her academic abilities, attendance and study

habits. During her training program she was fortunate enough to have an instructor who utilized proper teaching methodologies, had a caring demeanor in regard to her progress, and taught in a manner acceptable to her as an adult student.

Recommendations for Practice

The problems of dropout are very complex; however, from the theory derived from a review of literature and the knowledge gained from the findings of this study, insights were formulated about why students drop out of vocational training programs that will hopefully aid vocational educators and planners in deterring adult students from dropping out of critically important training programs - programs vital to the economic survival of themselves and their families. The following recommendations are made to vocational education professionals:

1. It is recommended that better methods should be implemented to collect, report, and organize more information about adult vocational students. Compilation of these data will provide a baseline from which theory can grow. Realization of needs and trends can become evident from an ongoing process of data collection and analysis.

2. To assist in placing students in a course that is interesting, appropriate, and properly scheduled, procedures should be implemented to assess <u>all</u> students in the areas of abilities, interests, and needs. As Course/Schedule was one of the most important discriminating variables, it is only natural that this area become a priority through assessment and testing.

3. In view of the findings regarding disabilities, finances, employment and family responsibilities, it is critical that information be gathered regarding students' personal, family and financial needs. Appropriate support and counseling services should be provided for the student.

4. The need for better dissemination of the types of programs and assistance available to students is critical; therefore, better marketing techniques should be utilized to (1) inform adults who may be facing layoffs, or plant closings; and reaching the unemployed by providing information through churches, libraries, and shelters; and (2) alert students of the available outside agency support systems available to assist them during training.

5. Handicapped students should be monitored regularly to ascertain not only if their special physical needs are being met, but that they acquire feelings of "fitting in" and experience aspects of socialization with other class members.

6. The quality of teaching performance and the care instructors show their students is important, therefore, all adult instructors should receive ongoing preservice and inservice training to keep them current and aware of the needs of this adult population.

7. Andragogical teaching techniques for instructors is important. As Instructor Abilities (ability, methods, and concern for students) was an important discriminating variable, determining what is important in meeting the needs of adult students in terms of methodology, expectations, and unique characteristics and needs becomes necessary.

8. Business and education linkages should be formed not only to alert the public sector of effective skill training being offered, but as potential placement sites for students completing their training program. Placement statistics become important to the relevancy of course offerings.

9. Establish business linkages that might assist with the financial needs of students preparing skills necessary to their business or industry. Early job placement, co-ops, or apprenticeships might be possible.

10. As a student's academic ability and performance are significant to completion, there is a distinct need to further develop adult basic academic skills along with, or prior to, enrollment in adult programs. A unit on "how to study" may also prove helpful.

11. Time should be allotted during the training program to allow students to get acquainted with one another, possibly a monthly get-together at lunch or other social activity to encourage friendships as these interpersonal relationship tend to encourage completion. Instructors should be part of that socialization and viewed as a resource person in the environment as opposed to a dominant provider of information. The instructor's concern for the student, if genuine, can assist in the student's completion of the program.

12. The technology expertise of teachers should be current and upgraded through inservice or "tech-leave" as instructor ability is important to students and may aid in their program completion.

13. There should be a concerted effort to implement what we already know - dissemination of information is vital.

Recommendations for Further Research

The population of full-time adult vocational students seeking occupationally specific training has not been studied previously. There has only been the knowledge base of the "nontraditional" adult student attending two-year and four-year programs, ABE, or GED programs from which to build theory. However, many discrepancies about significant variables related to dropout have surfaced when different populations are used. It is because of these discrepancies that studies unique to this population should be conducted. The following are recommendations for such further research:

1. There appeared to emerge a possible theory regarding the alleged significance of background characteristics and their association with dropout. It seemed that the type of population was associated with the type of learning environment selected by the student. This tended to have an effect on whether or not particular variables were significant to dropout and persistence. Most prior research dealt with contrasting nontraditional and traditional students with degreed or non-degreed institutions. Further research should be conducted to ascertain the possibility that the differences may lie in more complex combinations related to the learning environment selected by the adult student.

2. More research is necessary regarding handicapped students. Determining the other major types of handicap conditions that adult vocational students have (other than restricted mobility, sight, and hearing) will better prepare professionals in meeting both their physical, emotional, and social needs.

3. Follow-up studies are needed on completers and dropouts of these types of programs to determine employment status, need for additional training, economic condition, and the effect of their vocational training.

4. Replication of this study should be made in other states offering adult vocational job specific full-time training programs.

5. There is a strong need to further define additional variables contributing to retention of adult vocational students. Further contributions should be made to this emerging model through the addition of variables such as those contained in other models (e.g., motivation, congruence, expectancy theory).

Adults will be entering institutions of education of every kind as our country becomes a worldwide competitor in a technological market. This should impact the manner in which we advise, train, and educate adults. However, regardless of the decisions we as professional vocational educators make, if they are not made on the basis of sound research and implemented to reflect our new gained knowledge, adults will continue to refuse to participate or continue to dropout until we do so.

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