A Study of The Ohio State University College of Food, Agricultural, and Environmental Sciences' Ecological Paradigm Model

Robert Agunga[1], James J. Connors[2], and Hsing-Ying Chen[3]

Department of Human & Community Resource Development
The Ohio State University
Columbus, Ohio 43210

Abstract

A general outcry by environmentalists on unintended outcomes of agricultural practices has many land-grant universities searching for plausible ways to explain how they do business. From 1994 to 2000, The Ohio State University College of Food, Agricultural, and Environmental Sciences experimented with an "Ecological Paradigm Model" as a logical framework illustrating how agriculture and the environment can co-exist. The model focuses on a curriculum aimed at ensuring that agricultural and natural resources graduates understand the interrelationships between agriculture and the environment. This study was carried out to determine: a) faculty's perceived level of involvement in decision-making regarding the Ecological Paradigm Model; and b) their perceived knowledge, attitude and behavior towards the model. The study found that faculty members were generally satisfied with their participation in decision-making regarding the model. They also demonstrated a high degree of knowledge of the Ecological Paradigm Model; were highly supportive of the College's decision to adopt the model; and indicated active involvement in activities related to the Ecological Paradigm Model.

Introduction

The 21st century is witnessing a rethinking on the role of the Land-Grant University (LGU) in meeting the needs of the people it was established to serve. LGUs are also taking measures to re-establish public confidence in and support for higher education, which appears to be waning. Above all, use of the model can remind agricultural organizers they must pay attention to broader environmental and societal contexts. At The Ohio State University College of Food, Agricultural, and Environmental Sciences (OSU/CFAES), this reinvention of the land-grant university came in the form of an "Ecological Paradigm Model," an explanatory device showing that agriculture and the ecological system can mutually co-exist. The model was introduced in 1994 and faculty members were encouraged to incorporate it into their teaching, research and community outreach. Through the curriculum, research publications, and extension activities faculty members were encouraged to inform their audiences of the links among agriculture, the environment, and humanity. This paper reports a 2003 study that examined faculty members' perceived level of participation in the Ecological Paradigm Model decision-making and their perceived knowledge, attitude, and behavior towards the model.

Literature Review

Since the 1970s, Americans have grown increasingly concerned about the safety of their food and the potential impact of agriculture in degrading the environment (Agunga & Kazan,1997). By the early 1990s, public concern about these issues had become so pronounced that many Land-Grant Universities (LGUs) had to reinvent themselves to remain relevant. For the College of Food, Agricultural, and Environmental Sciences at The Ohio State University, this reengineering came in the form of the Ecological Paradigm Model. Dr. L. H. Newcomb (1994), Associate Dean and Director of Academic Affairs of the College, explained the rationale for this bold new initiative, thus:

We reached a decision that we could not continue business as usual. We had listened to the voices of our critics around Ohio and across the country. We seized an opportunity and made a commitment to respond to those concerns (p. 3).

The response was the Ecological Paradigm Model, representing a new vision for food systems education for the 21st century. It urges agricultural stakeholders to take a systems view of their professionthe integrated nature of the food, environmental, and human systems. In particular, the OSU/CFAES felt that the model was comprehensive enough to address the concerns of environmentalists, farmers, and the public as a whole. For decades, proponents of the alternative agriculture paradigm accused land-grant universities of aligning with conventional farmers by promoting research that destroys the ecosystem (Beus & Dunlap, 1992). The Ecological Paradigm Model, therefore, depicts the

[1] Associate Professor, 203 Agricultural Administration Building, 2120 Fyffe Road; Email: agunga.1@osu.edu
[2] Assistant Professor; Email: connors.49@osu.edu
[3] Master's Graduate; Email: chen.757@osu.edu

LGU as a multi-purpose research, teaching, and outreach institution capable of meeting the needs of a broad range of clientele, not farmers alone.

Dr. Moser described the Ecological Paradigm Model in the context of a four-sided pyramid. One side represents production efficiency; the second, economic viability; the third, environmental compatibility; and the fourth, social responsibility. According to Moser (1991), the four sides together form a structure with a programmatic strength greater than if each stood alone. Moser implored agriculturalists to always think of agriculture in connection with the environment and people. "Today's agriculture pays as much attention to the environment and society as to yields and the bottom line. This does matter as much to farmers as it does to the general public" (p. 1). Overall, he challenged faculty, students, and agricultural interest groups to keep four critical questions in mind as they make agricultural decisions: Is it economically viable? Is it productively efficient? Is it environmentally sound? And, is it socially responsible? He summarized the case for the Ecological Paradigm Model saying, "Agriculture has a moral obligation to produce a safe and abundant food supply for the United States and the world. But in so doing, we must take into account our impact on communities and the environment" (p. 1). By the same token, the model also calls on environmentalists to understand what farmers do and to appreciate their efforts at sustaining the ecosystem on which humanity depends.

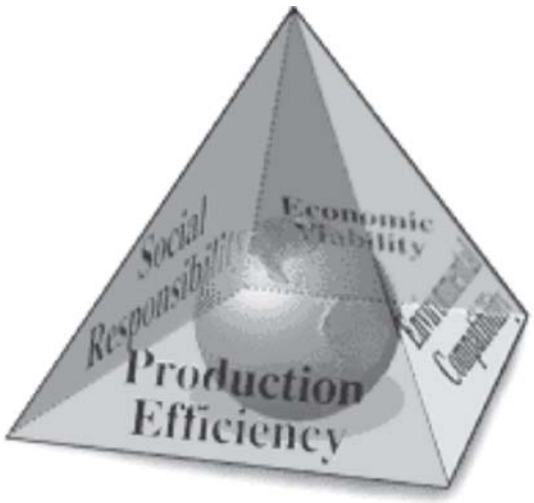

Figure 1. Ecological Paradigm Model of the College of Food, Agricultural, and Environmental Sciences at The Ohio State University

The Ecological Paradigm Model, therefore, provides a logical framework for advancing the cause of agriculture and sustaining the environment. For Ohioans, the adoption of this model by their Land Grant University is a timely one. Agriculture in Ohio is an $80 billion a year enterprise and the second largest industry employing 15 % of the state's 11 million people (Battelle Report, 2004). With a relatively high population density and a heavy dependence on agriculture, Ohio needs to pay attention to the environmental and human impacts of farming. In presenting the case for the Ecological Paradigm Model, Dr. Moser argued that rural and urban groups throughout the state had conflicting interests that often resulted in intense friction. Competing land use, urban encroachment, and animal waste disposal are but a few of these conflicting issues.

A major challenge agriculturalists face is presenting a compelling case for why non-farmers who make up almost 98 % of the American population, and who are several generations removed from the farm, must support public funding for agriculture. This non-farming population, including environmentalists, is important to farmers because, as the majority, it sets agricultural policy and determines how much public funding should go to this sector (McDowell, 2004). Therefore, the Ecological Paradigm Model is intended to build public trust and support for agriculture. Its design shows that farmers care about the environment and people and not just yields and profits. The Ecological Paradigm Model also serves as an innovative curriculum to help students understand the interdependent nature of agricultural, societies, and natural resource systems. However, the model can also serve as a framework for dialogue on contemporary agricultural issues.

The pyramid logo (shown in Figure 1) was the main marketing tool for the ecological paradigm experiment. It was displayed on nametags, college publications, and in offices of academic departments, The Ohio State University Extension (OSUE), and the Ohio Agricultural Research and Development Center (OARDC). Curriculum materials were developed for use by faculty to teach students fundamental ecological principles and how they impact agriculture. The overall aim was to ensure that, over time, anyone in the agricultural industry would be able to explain the model to non-farm audiences.

The Ecological Paradigm Model experiment lasted from 1994 to 2000 and was funded by the Kellogg Foundation. This study, conducted in 2003, sought to assess the effectiveness of the experiment based on faculty's perceived level of involvement both in the Ecological Paradigm Model decision-making and the execution of the experiment.

Purpose and Objectives

The purpose of this study was to determine faculty members' perceived level of satisfaction with

the Ecological Paradigm Model experiment. The specific objectives were:

1. To examine faculty members' perceived level of participation in the Ecological Paradigm Model experiment activities;
2. To assess faculty's knowledge, attitude, and behavior towards the Ecological Paradigm Model; and
3. To determine the relationship between faculty members' demographics and their perceived knowledge, attitude, and behavior towards the Ecological Paradigm Model.

Methodology

This was a descriptive-correlation study. The descriptive portion examined the knowledge, attitude, and behavior of faculty towards the Ecological Paradigm Model, and level of participation in the Ecological Paradigm Model decision-making. The correlation portion examined the relationships between selected demographics of faculty members and their perceived knowledge, attitude, and behavior towards the Ecological Paradigm Model.

The target population was College of Food, Agricultural, and Environmental Sciences faculty at The Ohio State University as of June 2003, including those who retired or transferred out of the College five years preceding this date. The total number of College faculty members was 472. A systematic random sample of 212 was drawn (Krejcie & Morgan, 1970). A mail questionnaire was used containing demographic questions and 6-point-Likert scale questions relating to knowledge (6 questions), attitude (22 questions), and behavior (9 questions) towards the Ecological Paradigm Model.

The content and face validity of the instrument was assessed by a panel of experts familiar with the Ecological Paradigm Model of the College. A pilot test (n=15) was also conducted to establish the reliability of the instrument. The faculty members in the pilot test were not included in the study sample. The internal consistency of the instrument was measured using Cronbach's alpha, yielding an alpha reliability of faculty's perceptions of the Ecological Paradigm Model of .85, which exceeded the minimum of .50, suggested by Nunnally (1967). The response rate, after three mailings, was 50.9%. To control for non-response error, early- and late-responses were compared using independent sample t-tests. No significant difference was found. Therefore, the results are generalizable to the target population.

Data analysis was done using the Statistical Package for the Social Sciences (SPSS 12.0 for Windows, Norusis, 2002). Descriptive statistics including frequencies, percentages, measures of central tendency, and dispersion were calculated. Inferential statistics including t-tests and analysis of variance were used to address the objectives of the study. Pearson product-moment correlations were also calculated between ratio level variables. Davis' (1971) descriptors were used to describe the magnitude of correlations.

Findings and Conclusions

The findings of the study are reported for each research objective.

Objective 1: Faculty perceived participation in decision-making regarding the Ecological Paradigm Model

Faculty governance is the heart of a vibrant university. It is an empowered decision-making process whereby faculty members and university administrators arrive at decisions acceptable to both parties. Without faculty support it is almost impossible for any university to function effectively. Axley (1996) states that when workers voluntarily participate in decision-making, they tend to accept the outcomes and generally participate in carrying out decisions agreed upon. This study sought to determine whether faculty participated in: a) the decision to adopt the Ecological Paradigm Model; and b) activities designed to achieve the objectives of the ecological paradigm experiment. The study did not investigate whether participation was voluntary or coerced.

Faculty members were asked whether they participated in the Ecological Paradigm Model activities, such as attended guest lectures, town hall meetings, workshops, and internet discussions. They were also asked if they collaborated on team teaching, interdisciplinary research, and grant writing.

Eighty-two percent of respondents indicated reading CFAES literature on the Ecological Paradigm Model through the Envision magazine and the internet which suggests a high degree of awareness of the program. Also, 66% of respondents indicated attending presentations by Dean Moser, a further indication of their awareness of the program. However, only 24.7% of the respondents participated in the 2000 Ecological Paradigm Luncheon Series. Similarly, only 13.0% of them indicated involvement in faculty meetings that discussed application of the ecological paradigm in their teaching. The low participation in the latter two events may be explained by the fact that these were specialized events drawing only those who were interested whereas the former two events were general sessions which all faculty were expected to attend.

In summary, faculty participation at ecological paradigm lectures was high. However, this cannot be viewed as an indication of voluntary participation as it was generally expected faculty would attend these meetings. On the other hand, the low participation at the luncheon series and meetings designed to access outcomes of the experiment cannot be viewed as a lack of interest on the part of faculty members because these were designed to attract faculty involved in specific projects, such as team teaching or grant writing. An open-ended question provided further insight on faculty interest in the Ecological

Paradigm Model. Although no effort was made to quantify the number of respondents who said what, the comments were mixed. Some respondents described the Ecological Paradigm Model as an important concept whose time had come. Others felt it was a propaganda technique, manipulative, full of empty promises, and biased towards agriculture. Thus, it is inconclusive as to whether the high degree of faculty participation at the ecological paradigm lectures was any indication of support for the program because it could well have included critics looking for information to defend their position.

they could identify the four sides of the pyramid, explain the model to anyone, or visualize the pyramid logo, all yielded mean responses above 4.0. However, the means to other questions, such as "I believe that one of the four sides of the pyramid is more important than the others" and "The pyramid was displayed in my department/county office" yielded means slightly lower than the group mean.

Table 2 shows faculty's attitude toward the Ecological Paradigm Model. The mean score for nine questions on this topic was 4.04 (SD=1.04), showing that faculty attitude was moderately positive. Three individual items scored higher than the group mean (4.04). For example, the question: "The adoption of the ecological paradigm by the College is consistent with national agricultural concerns" received a mean score of 4.59 (SD=0.98) while the question: "The ecological paradigm is an effective way to illustrate the relationships among agriculture, the environment and people" also received a strong mean score of 4.44 (SD=1.14).

Table 1. Faculty's knowledge of the Ecological Paradigm Model

Statement	M	SD
I am familiar with the CFAES' ecological paradigm.	4.65	1.24
The four sides of the pyramid: production efficiency, economic viability, environmental compatibility and social responsibility summarize the primary dimensions of agriculture and natural resources issues.	4.40	0.99
I can clearly picture the four sides of the pyramid logo.	4.25	1.47
I can explain the ecological paradigm to someone.	4.11	1.36
I believe that one of the four sides of the pyramid is more important than the others. (answer reversed)	3.92	1.01
The pyramid was displayed in my department/county office.	3.83	1.59
Overall Mean	4.19	0.89

Scale: 1 = very strongly disagree, 2 = strongly disagree, 3 = disagree, 4 = agree, 5 = strongly agree, 6 = very strongly agree

Objective 2: Faculty knowledge, attitude and behavior toward the Ecological Paradigm Model

Questions for this objective were divided into three sub-categories testing knowledge, attitude and behavior. Six statements, on a 6-point-Likert scale, measured faculty's knowledge of the ecological paradigm, as shown in Table 1. The mean of the faculty responses to these questions was 4.19 (SD=0.89, N=108). The mean to the question: "I am familiar with the ecological paradigm" was 4.65, (SD=1.24). Other questions about faculty knowledge of the Ecological Paradigm Model, such as whether

Table 2. Faculty's attitude toward the ecological paradigm

Statement	M	SD
The adoption of the ecological paradigm by the college is consistent with national agricultural concerns.	4.59	0.98
The ecological paradigm is an effective way to illustrate the relationships among agriculture, the environment and people	4.44	1.14
I believe the college was innovative in adopting this model.	4.11	1.22
The ecological paradigm provides a common framework for departments/units in the college to discuss a variety of issues.	4.00	1.15
The ecological paradigm helps our students understand the interrelationships in a changing world.	3.96	0.93
The College needed to introduce the Ecological Paradigm Model.	3.91	1.14
I believe that the College has been open to faculty participation in decisions related to the ecological paradigm, such as how faculty could apply it in their teaching, research or outreach.	3.88	0.81
I believe that other land grant universities can benefit from adopting the ecological paradigm.	3.84	0.92
The Ecological Paradigm Model will prepare students for success in their future careers.	3.63	1.03
Overall Mean	4.04	1.04

Note: scale: 1 = very strongly disagree, 2 = strongly disagree, 3 = disagree, 4 = agree, 5 = strongly agree, 6 = very strongly agree

Table 3. Faculty participation in Ecological Paradigm Model activities

Activity	f	%
Faculty who participated in interdisciplinary research teams(s) focused on the ecological paradigm.	29	29.0
Faculty who obtained research grants for project related to the ecological paradigm.	19	18.6
Faculty who made professional presentations based on the ecological paradigm.	19	18.6
Faculty who published research article(s), book chapter(s) or book(s) based on the ecological paradigm.	15	14.7
Faculty who served on a working committee related to the ecological paradigm.	8	8.1
Faculty who team-taught courses based on the ecological paradigm.	7	6.9

However, six items scored lower than the group mean. The lowest means were to the questions: "I believe that other land-grant universities can benefit from adopting the Ecological.

Paradigm Model (Mean=3.84, SD=.92) and "The Ecological Paradigm Model will prepare students for success in their future careers" (Mean=3.63, SD=1.02). These scores indicate a slight disagreement lukewarm endorsement of the issues. The tepid response perhaps suggests that it is too early to assess the impact of the experiment on student performance let alone speculate on its usefulness for other institutions. What the top two scores indicate is a general agreement by faculty that the Ecological Paradigm Model is needed to address concerns facing the food and agricultural industry.

The third sub-objective was to determine a faculty member's perceived behavior towards the Ecological Paradigm Model. The statement: "I apply the ecological paradigm in my teaching, research or extension outreach" had a mean score of 3.75 (SD=1.29).

Respondents were then asked to indicate specific instances of application. About 29 % of respondents participated in interdisciplinary research related to the Ecological Paradigm Model. Eighteen percent obtained research grants for projects related to the ecological paradigm. The same percentage of faculty also made professional presentations based on the Ecological Paradigm Model. Others indicated having team-taught classes or served on committees related to the Ecological Paradigm Model as shown in Table 3.

Although these percentages are low, 29% or less, they suggest that faculty were interested in collaborative ventures. Whether this interest prevailed prior to the introduction of the Ecological Paradigm Model is difficult to say as no baseline data was gathered. Apparently, when the climate is favorable, faculty will engage in collaborative research and teaching activities.

Objective 3: The relationship between selected faculty demographics and faculty knowledge, attitude, and behavior toward the Ecological Paradigm Model

The three demographic variables that were measured were: age, administrative rank, and farm background. Does a respondent's age, rank, or farm background affect one's knowledge, attitude or behavior toward the Ecological Paradigm Model?

Pearson's correlation coefficient was used to examine the relationship between a faculty member's age and each of the three variablesknowledge, attitude, and behavior toward the Ecological Paradigm Model. Table 4 shows that the values of Pearson's Correlation Coefficients were very low and statistically not different from zero (-0.08 between age and knowledge; .05 between age and attitude; and .05 between age and behavior) towards the Ecological Paradigm Model. These relationships show that a faculty member's age was not a factor that affected his or her perception toward the Ecological Paradigm Model.

T-tests and ANOVA were used to compare mean scores on knowledge, attitude, and behavior towards the Ecological Paradigm Model and a faculty member's rank. Is there a difference in knowledge levels between faculty members with administrative duties, such as department chairs and assistant deans, versus those

Table 4. Correlation between faculty's age and knowledge, attitude, and behavior towards the ecological paradigm

Variables	Pearson's Correlation Coefficients (r)	Davis' Descriptors
Age / Knowledge on EP	-.08	Negligible
Age / Attitude on EP	.05	Negligible
Age / Behavior on EP	.05	Negligible

without, such as assistant and associate professors? Table 5 shows that respondents with administrative rank had higher mean scores than those without. The mean scores were: knowledge, 5.37(SD=.66) compared to 4.14 (SD=.86), attitude, 4.75 (SD=.64) compared to 3.94 (SD=.70), and behavior 4.33 (SD=.82) compared to 3.58(SD=.84) toward the Ecological Paradigm Model.

Table 5. T-tests for equality of mean scores on the ecological paradigm between faculty with and without administrative duties

Dependent Variable	N	M	SD	t	p
Knowledge of Ecological Paradigm					
Administrators	5	5.37	.66		
Faculty (Non-Administrators)	103	4.14	.86	-3.14	.002*
Attitude Toward the Ecological Paradigm					
Administrators	5	4.75	.64		
Faculty (Non-Administrators)	103	3.94	.70	-2.55	.012*
Behavior Toward the Ecological Paradigm					
Administrators	5	4.33	.82		
Faculty (Non-Administrators)	103	3.58	.84	-1.96	.052

*p < .05

Table 6. ANOVA tests of demographics on faculty's knowledge of the Ecological Paradigm Model

Independent Variable	N	M	SD	F	p
Academic Rank					
Professor Emeritus	9	3.63	.87	1.66	.180
Professor	32	4.30	.81		
Associate Professor	31	4.22	1.03		
Assistant Professor	31	4.04	.69		
Farm Background					
Farm background	47	4.43	.90	2.93	.058
Non-farm background with farm experience	27	4.06	.85		
Non-farm background	33	4.01	.82		
Disciplinary Area					
Life Sciences	71	4.22	.92	.82	.487
Humanities	3	4.00	.1.01		
Social/Behavioral Sciences	31	4.22	.84		
Other (Physical Sciences & Other)	2	3.25	.59		

*p<.05

One-way ANOVA (Analysis of Variance) tests were employed to determine if the selected demographic variablesacademic rank, farm background, and disciplinary orientationhad any impact on the faculty members' knowledge, attitude, and behaviors toward the Ecological Paradigm Model. The test results are shown in Tables 6, 7 and 8. In the case of academic rank (Table 6), the F-statistic was 1.66, in which case the null hypothesis that all ranks have the same mean could not be rejected. Therefore, rank was not a factor that affected faculty's knowledge of the ecological paradigm. It implies that faculty of all ranks learned about the ecological paradigm through the same sources, such as attending the lectures, town hall meetings or via email. In essence, the communication strategies used to spread information about the ecological paradigm seemed effective in reaching all faculty.

On farm background, an F-statistic of 2.93 showed that it did not affect the mean scores of faculty's knowledge of the ecological paradigm. Faculty with farm background do not have higher levels of knowledge of the ecological paradigm than say, faculty from non-farm background. It suggests that the educational methods used were effective for farm as well as non-farm faculty.

The test on disciplinary area also produced a low F-statistic equal to 0.82, showing that a faculty member's disciplinary area, such as agronomy or natural resources, did not affect his or her knowledge of the ecological paradigm.

The test results of demographics on a faculty member's attitude on the Ecological Paradigm Model are shown in Table 7. The academic rank, with an F-statistic of .58, indicated that a faculty member's rank did not affect his/her attitude towards the Ecological Paradigm Model. The test on the variable of farm background, however, returned an F-statistic of 6.50, meaning that faculty from farm and non-farm background had different mean scores. Once it was determined that differences existed among group means, a post-hoc Tukey HSD (honestly significant difference) test was performed to identify the differences in the groups. The mean of the group with farming background was higher than the other two groups. The respondents with farming background had higher mean scores on attitude than those without farm background and those without a farm background but with farm experience. It means that faculty from farm backgrounds were more favorable toward the Ecological Paradigm Model than those from non-farm audiences. This is significant considering that faculty in natural resources tend to be from non-farm backgrounds whereas agricultural faculty tend to be from farm backgrounds (Beus & Dunlap, 1992). Thus, if the goal of the Ecological Paradigm Model was to unite faculties in agriculture and natural resources, the two main components of

the College, this did not happen. However, a faculty member's disciplinary area did not affect his or her knowledge of the ecological paradigm (F-statistic=0.77).

The test results of demographics on a faculty member's behavior toward the Ecological Paradigm Model are shown in Table 8. A low F-statistic in the case of academic rank (.58) showed that rank was not a factor that affected faculty's behavior on the Ecological Paradigm Model. The ANOVA test of farming background on faculty's behavior generated an F-statistic of 5.07. This offered sound evidence that faculty with farming background performed more Ecological Paradigm Model related activities than faculty with non-farm background. Given Beus and Dunlap's (1992) contention that natural resources faculty tend to be of non-farm background, the finding suggests that OSU/CFAES natural resources faculty, perhaps, were less involved in the Ecological Paradigm Model activities than agricultural faculty with farm backgrounds. Finally, the disciplinary area of a respondent was not a significant factor that determined the faculty's behavior on the ecological paradigm (F = .70).

Table 7. ANOVA tests of demographics and faculty's attitude on the ecological paradigm

Independent Variable	N	M	SD	F	p
Academic Rank					
Professor Emeritus	9	3.97	.40	.58	.630
Professor	32	3.83	.85		
Associate Professor	31	4.06	.74		
Assistant Professor	31	3.92	.55		
Farm Background					
Farm background	47	4.24**	.67	6.50	.002*
Non-farm background with farm experience	27	3.82	.68		
Non-farm background	33	3.72	.71		
Discipline Area					
Life Sciences	71	4.04	.69	.77	.512
Social Sciences	31	3.88	.81		
Humanities	3	3.97	.29		
Other (Physical Sciences & Other)	2	3.42	.35		
Other		3.58	--		

* p < .05
** Means significantly different

Table 8. ANOVA tests of demographics on faculty's behavior on the ecological paradigm

Independent Variable	N	M	SD	F	p
Academic Rank					
Professor Emeritus	9	3.74	.28	.58	.629
Professor	32	3.44	.89		
Associate Professor	31	3.69	1.03		
Assistant Professor	31	3.56	.69		
Farm Background					
Farm background	47	3.89**	.79	5.07*	.008
Non-farm background	33	3.44	.76		
Non-farm background with farm experience	27	3.32	.95		
Discipline Area					
Life Sciences	71	3.66	.86	.70	.552
Humanities	3	3.67	.33		
Social/Behavioral Sciences	31	3.54	.89		
Other (Physical sciences & Other)	2	2.83	.24		

* p < .05
** Means significantly different

In summary of this objective, although a faculty member's age and disciplinary background had no effect on his/her knowledge, attitude and behavior toward the ecological paradigm, his or her farm background had some effect on attitude and behavior toward the ecological paradigm. The mean score of faculty with farm background differed significantly from those without farm background. Also, faculty with, and without administrative responsibilities, significantly differed in their knowledge and attitude, but not behavior towards the Ecological Paradigm Model.

Conclusions

This study set out to: a) examine faculty members' perceived level of participation in decision-making regarding the ecological paradigm; b) assess faculty knowledge, attitude, behavior towards the ecological paradigm; and c) determine the relationship between faculty demographics and their perceived knowledge, attitude, and behavior towards the Ecological Paradigm Model.

To the first objective, faculty members indicated active participation in Ecological Paradigm Model activities. The reason for this high rate of involvement is, however, not clear. Maybe faculty simply responded to their Dean's call. It could also be that they were interested in what the speakers had to say, for a variety of reasons. However, the data showed

that faculty had an interest, be it modest, in the Ecological Paradigm Model and wanted to see it succeed.

To objective two, the mean scores and standard deviations of variables related to these issues were moderate, indicating that faculty had moderate knowledge, attitude and behavior toward the Ecological Paradigm Model. Many could recall the four sides of the pyramid, wanted the experiment to continue, and were involved in research teams or team-teaching activities. The study did not establish any causality between the activities and faculty's interest in the program. What it did was show that faculty had good memories of the experiment.

To objective three, Pearson's correlation coefficient and independent samples t-test were used to determine how demographic variables related to faculty's knowledge, attitude, and behavior toward the Ecological Paradigm Model. Two significant findings are noteworthy. One is that faculty with administrative rank, such as department chairs, had higher mean scores on knowledge and attitude, but not behavior, toward the Ecological Paradigm Model than faculty without administrative duties. Not surprisingly, the administrators would be more cognizant of the Model since they interacted with the public more and were also more involved in testing acceptability of the Model before it was presented to faculty. The small number of administrators suggestions caution in generalizing the findings. However, by showing significant interest in the Model, these administrators may have set a good example for their faculties to follow which may account for the overall interest in the program by faculty.

The second significant finding was that farm background had some effect on faculty attitude and behavior toward the Ecological Paradigm Model. It means that those from farm background were more likely to support the Model than non-farm faculty. This could be a concern if the goal of the Ecological Paradigm Model is to build a strong cohesion between agricultural and natural resources faculties.

Recommendations

Based on the above findings, the following recommendations are made.

1. Dr. Moser's proposal that agriculturalists pay particular attention to the environment and society is an important problem which Land Grant Universities cannot ignore. Farmers can no longer focus on yields and profits at the expense of people, communities and the ecological system. Agricultural faculty cannot teach piecemeal courses without helping students to understand the interconnectedness between agricultural and natural resources. It is important for agricultural interests groups to be constantly reminded of Dr. Moser's four questions: Is it economically viable? Is it productively efficient? Is it environmentally sound? Is it socially responsible? The public's trust in, confidence in, and support for agriculture can be sustained only if they see that responsible measures are taken to address potentially harmful effects of agriculture, before they occur.

2. The undergraduate curriculum is perhaps the best way to inculcate the ecological paradigm philosophy in the minds of future agricultural and natural resources professionals. The College Administration must continue to encourage faculty to incorporate elements of the Model in their classrooms. For example, asking students to write research papers or engage in group projects that address dimensions of the Model are possible ways of helping students to internalize the Model. It is important, therefore, that the College provides orientation services for new faculty so that they understand the Ecological Paradigm Model and apply it in their teaching, research and service activities.

3. If the Ecological Paradigm Model was of interest to faculty, it should be of equal importance to what McDowell (2004) calls the "agricultural establishment," that is, the constellation of organizations and agencies that support and regulate farming and agricultural processing industries, such as county and state legislators, agribusinesses, and extension personnel. The Ohio State University College of Food, Agricultural, and Environmental Sciences needs to take its message to these practitioners and policymakers.

4. Agricultural communicators in the Land Grant Universities and agricultural industries' information units must assume responsibility for spreading the Ecological Paradigm Model to the public. Only through communication, education and outreach can the public's perception of agriculture be shaped. This implies that not only must agricultural communicators report agricultural issues accurately and objectively they must also understand the issues that concern people and provide information proactively to help them deal with these concerns. Therefore, agricultural communication students, as future farm reporters, must be well-versed on the Ecological Paradigm Model so that they can propagate it to the public.

5. This in-house study sought to draw attention to proactive efforts by Land Grant institutions to address public concerns, especially on the impact of agriculture on the environment. It would seem to us that social and behavioral scientists in these institutions, such as agricultural communication, education, and extension researchers, have a responsibility to study experiments, such as the Ecological Paradigm Model as action research. We do not believe that in-house research compromises the integrity of researchers. Indeed, there is an overwhelming demand for social science research that helps solve practical problems.

6. This study is only the beginning of more studies that could be done on the Ecological Paradigm Model. For example, what are the perceptions of

agricultural industry stakeholders who have been exposed to the Model? How successful is the model in preparing graduates who are now employed in agricultural and natural resources industries and organizations? How is the Model spreading within the broader Ohio State University community, the Greater Columbus area, and the State of Ohio in general?

Literature Cited

Agunga, R. A. & Kazan, A. L. (1997). Innovative farmers: A challenge for extension systems worldwide. Journal of Extension Systems. Vol. 13, No. 1. June, No. 2, December.

Axley, S. R. (1996). Communication at work: Management and the communication-intensive organization. Westport, Connecticut: Quorum Books.

Battelle Report (2004). OARDC's (Ohio Agricultural Research and Development Center)'s Path to the future. Executive summary. OARDC unpublished document.

Beus, C. E. & Dunlap, R. E. (1992). The alternative-conventional agriculture debate: Where do agricultural faculty stand? Rural sociology 57(3), 1992, pp. 363-380.

Davis, J. A. (1971). Elementary survey analysis. Englewood, NJ: Prentice Hall.

Krejcie, R.V. & Morgan, D. W. (1970). Determining sample size for research activities. Educational and psychological measurement (30), pp. 607-610.

McDowell, G. R. (2004). The agricultural establishment: Giving farmers too much of what they want and not enough of what they need. Choices: The magazine of food, farm and resource issues. http://www.choicesmagazine.org/current/2004-1-08.htm.

Moser, B. D. (1991). An agricultural call to arms: Addressing society's concerns. Columbus, Ohio: OSU/CFAES Publication.

Newcomb, L. H. (1994). Charting a course that our future demands. Becoming a prototype of what agriculture colleges must be to thrive in the next century. Columbus, Ohio: OSU/CFAES publication.

Norusis, M. J. (2002). SPSS 11.0 guide to data analysis. Upper Saddle River, NJ: Prentice Hall.

Nunnally, J. C. (1967). Psychometric theory. New York: The McCraw-Hill Companies.