

AN ASSESSMENT OF AGRICULTURAL SCIENCE GRADUATES' INTEREST IN PARTICIPATING IN CREDIT COURSES USING DISTANCE EDUCATION

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Abstract

The study assessed interest of 649 agricultural science graduates in completing courses delivered by distance education. Graduates were surveyed by mail to 1) determine their level of interest in completing courses offered by distance education, 2) compare the characteristics of graduates who are interested in distance education with those who are not, 3) examine factors that may influence their demand for credit courses delivered through distance education, and 4) identify conditions under which agricultural science graduates will participate in credit courses delivered through distance education. Most of the respondents were interested in taking courses by distance education. There were slight differences between the demographics of those interested in taking courses by distance education and those not interested. Attitude towards distance education and whether or not respondents had teacher certification were identified as the most important variables in determining interest in taking courses by distance education. Most respondents prefer to study on their own and at their own pace. Departments and colleges must develop courses that are flexible enough to accommodate the needs of distant students.

Introduction/Theoretical Framework

In colleges of agricultural sciences, communications technologies have the potential to increase course access to homebound students as well as those who, for reasons such as careers and other responsibilities, are unable to access residential programs. Currently, agricultural education institutions are using communications technologies for a variety of educational activities. Using video, print, satellite, and computers, agricultural educators are increasingly delivering programs to large numbers of learners with diverse backgrounds and in different locations (Miller, 1997; Miller & Honeyman, 1993; Nti & Thomson, 1996; Murphrey & Christiansen, 1997). Communications technologies are also being used to supplement classroom instruction in various ways. Marrison et al. (1992) used computers to supplement classroom instruction as well as

simulate dangerous, complex, and/or expensive experiments. Also, Schumaker and Strickland (1992) used computers to teach students how to adjust combine harvesters and thus, eliminated the need to provide the equipment and materials. Further, interactive video discs have been used to teach agriculture related subjects to the general public (Rockwell et. al., 1990; Weaver et. al., 1991). In addition, several programs are being delivered by satellite to students and the general public through the Agricultural Distance Education Consortium or ADEC (AG*SAT Corporation, 1993; Kiernan et. al., 1995).

While communications technologies are increasingly being used to deliver instruction in agriculture, there is the need to understand them further and expand their uses in order for institutions to gain full benefit. Bowen and Thomson (1995) observed that the potential for

using communications technologies to deliver instruction in agricultural colleges remains untapped. The ability to tap this new resource successfully could help strengthen agricultural education programs. However, to effectively tap this new resource, agricultural education programs must determine the interest of potential students and factors that may influence their decisions to participate. Course instructors must understand the background and characteristics of students in order to develop effective programs to meet their needs. According to Threlkeld and Brzoshka (1994), "background and descriptive data will help in curriculum decisions, program design and perhaps, most importantly, what to expect in terms of learning from distant students." Willis (1989) also stressed the importance of understanding the backgrounds and needs of distant learners when planning distance education courses. According to Kemp et al. (1994, p.50), one of the key elements of the instructional design process is learner characteristics that can impact instruction. Kemp et al. also suggest considering interest, age, and maturity of learners among other factors.

A number of researchers have examined several aspects of distance education and how it might be used in the agricultural sciences. No study, however, has documented the level of interest that potential students have in enrolling in credit courses. Further, no research has examined the interest that agricultural science graduates have in enrolling in distance education credit courses. Thus, the problem examined in this study was: What level of interest exists among college of agricultural science graduates to enroll in credit courses delivered by distance education and what factors and conditions impact that level of interest?

Purpose and Objectives

The primary purpose of the study was to assess the level of interest that agricultural science college graduates have in completing distance education credit courses that can be used to meet their professional development, advanced degree,

and teacher certification needs. A secondary purpose was to examine factors and conditions that influence the graduates' interest in enrolling in distance education credit courses. The objectives were to:

1. Determine the level of interest that agricultural science graduates have in completing credit courses offered by distance education.
2. Compare the characteristics of graduates who are interested in distance education with those who are not.
3. Examine factors that may influence the demand for credit courses delivered through distance education.
4. Identify conditions under which agricultural science graduates will participate in credit courses delivered through distance education.

Population and Sample

Two target populations of graduates were used in the study. The first group studied consisted of students who graduated with bachelor's and/or master's degrees in agriculture-related disciplines in the eastern region of the United States between the 1992 and 1996 academic years (non-agriculture teachers). The second group was comprised of all secondary agricultural science teachers in the eastern region regardless of when they graduated. Lists of graduates who received bachelor's and master's degrees in agriculture were used as the frame for the non-agriculture teachers' population. The lists were obtained through the academic program deans and college alumni associations of the selected universities. These lists were obtained from eight institutions in eight states within the eastern region (as defined by the National Association of State Universities and Land Grant Colleges) of the United States. The 1996

Agricultural Educators' Directory (Henry, 1996) was used as a frame for selecting the agriculture teachers' sample. The population for the teachers was 1,145 and that of the non-teachers was 5,547.

Two independent random samples were selected from the two populations using a 3% sampling error (Krejcie & Morgan, 1970). This procedure yielded a random sample of 533 agriculture teachers and a random sample of 824 subjects was selected from the agriculture graduates. In total, 1,357 subjects were selected for the study. Stratified sampling techniques were used to select proportional samples from each state for both groups.

Instrumentation

A questionnaire was developed by the researchers to elicit responses about 1) interests of agriculture graduates in participating in courses offered through distance education, 2) their attitudes towards distance education, 3) the conditions under which they would like to take courses offered through distance education and, 4) demographic data. The questionnaire was reviewed by a panel consisting of four senior faculty members of the Department of Agricultural and Extension Education and one from the Department of Agronomy at The Pennsylvania State University. Their selection was based on the faculty members' knowledge of distance education, agricultural education, and research methods. Appropriate revisions were made based on the comments and suggestions from the panel. The questionnaire was pilot tested on a sample of 60 agriculture graduates in the target population who were not selected for the study.

Interest in enrolling in distance education credit courses was determined using a single yes/no item. A scale to assess attitudes consisted of five items with four response categories ranging from "strongly disagree" to "strongly agree". The Cronbach's alpha coefficient calculated to establish the internal consistency of the attitudinal scale was .67.

Data Collection and Analysis

Data collection was conducted in three stages. The questionnaire along with a cover letter and business reply envelopes were mailed to all agriculture graduates on February 6, 1997. Reminder postcards were mailed after 10 days. Two weeks after the postcards had been sent, reminder letters, additional copies of the questionnaire, and business reply envelopes were sent to the non-respondents. Of the 1,357 copies of the questionnaire mailed to agriculture graduates, 662 were returned and 649 were usable (49% response rate). Of the 293 questionnaires received from agriculture teachers, 289 were usable and 360 of the 368 questionnaires returned by non-agriculture teachers were usable. The agriculture teachers had a higher response rate (55%) than the non-agriculture teachers (44%). The chi-square procedure was used to compare early respondents (those who responded within three weeks after the questionnaires were mailed) with late respondents (those who responded more than three weeks after the questionnaires had been mailed) among the agriculture graduates. Respondents in the two groups were compared in terms of age, gender, highest degree attained, certification, and type of graduate (whether they were teachers or non-teachers). There were no significant differences ($p > .05$) between the two groups on any of the variables except type of graduate (whether graduates were teachers or non-teachers). More of the non-agriculture teachers were in the early respondents group. The Statistical Package for the Social Sciences version 6.1 (SPSS, 1995) was used to analyze all data. Frequencies, percentages, means, standard deviations, and correlations were used to describe the data. Discriminant analysis was used to examine graduates' interest in taking courses through distance education.

Findings

To achieve the objectives, the researchers asked the graduates whether or not they were

interested in pursuing courses through distance education. Graduates were asked to provide demographic and attitudinal data and to respond to items relating to conditions under which they would like to participate in courses offered through distance education. Graduates were also asked to indicate whether or not they were interested in taking courses for professional development, advanced degrees, or teacher certification.

Objective #1: Determine level of interest that agricultural science graduates have in completing courses offered by distance education.

Four hundred and forty-five (68.6%) of the 649 respondents expressed interest in taking courses offered through distance education. Thus, 204 (31.4%) indicated that they were not interested in taking courses through distance education. Slightly more agriculture teachers (73.4% versus 64.7%) expressed an interest in taking courses offered through distance education. Most graduates were interested in taking courses for professional development (367 or 82%) and advanced degrees (218 or 50%). Few respondents were interested in taking courses for teacher certification (87 or 19%).

Objective #2: Compare the characteristics of graduates who are interested in distance education with those who are not.

To gain insight about the graduates' interest in taking courses through distance education, graduates who expressed interest in taking courses through distance education were compared on selected characteristics with those who were not interested. The findings in Tables 1 and 2 indicate that graduates who expressed interest in taking courses through distance education tended to be slightly older (55% were 30 years or older) than those who were not interested (50% were 30 years or older). From a gender perspective, 67.9% of the graduates who were interested and 68.2% of those not interested in taking courses by distance

education were males. This means that females comprised almost 1/3 of the graduates in the interested and not interested categories. More of the graduates who were interested were married (64.8%) compared with those not interested (57.2%). Sixty-two percent of graduates who were interested in taking courses through distance education had only bachelor's degrees and 76.7% had permanent teacher certification, while 60.9% of those not interested had bachelor's degrees and 92% had permanent certification.

Objective #3: Examine factors that may influence the demand for credit courses delivered through distance education.

In order to examine the factors that may influence graduates' interest in taking courses delivered through distance education, discriminant analysis was used to determine the distinguishing attributes of graduates who were interested in taking courses through distance education and those who were not interested. The dependent variable was interest ("Yes" or "No") in taking courses offered through distance education. The independent or predictor variables were age, gender, marital status, certification, highest degree attained, household income, attitude, and type of graduate (whether graduates were teachers or non-teachers). The independent variables were dummy coded 0 or 1. Intercorrelations computed among variables used in the model indicated few relationships of high strength (Table 3).

As shown in Table 4, attitudes of agriculture graduates toward distance education and certification together explained 23% of the variance in interest in taking courses delivered through distance education (Wilks' Lambda = .77). An examination of the standardized canonical discriminant function coefficients (Table 4) shows that the best predictor of interest in taking courses or programs delivered through distance education was attitude toward distance education. This variable explained 22% of the

variance ($\Lambda = .78$) while certification explained another 1%.

The researchers further examined the discriminant analysis model to determine how accurately it classified the respondents by interest. The discriminant function accurately classified interest in taking courses through distance education 70.2% of the time. The discriminant function accurately classified 69.1% of agriculture graduates as interested in taking courses through distance education. The discriminant function also accurately classified 72.9% of the graduates as not interested in taking courses through distance education (Table 5).

Objective #4: Identify Conditions Under Which Agricultural Science Graduates will

Participate in Credit Courses Delivered Through Distance Education.

The graduates were also asked to indicate the conditions under which they would participate in courses offered through distance education. Most graduates (80.9%) reported that they would drive to a satellite downlink site to receive instruction. Those who said they would drive to a satellite downlink site were willing to drive an average of 25 miles to a site ($M = 24.8$ miles). Among agriculture graduates, 277 (66.4%) would take an average of 1.5 courses per semester ($M = 1.53$ courses per semester) for certification, graduate degree, and professional development. Most preferred to work at their own pace (69.2%) and study on their own (76.7%). However, a significant number (39.3%) also preferred to interact with other students (Table 6).

Table 1 Age, Gender, and Marital Status of Agriculture Graduates Interested in Taking Courses Through Distance Education and Graduates Not Interested

Characteristic	Interested		Not Interested		Total	
	f	%	f	%	f	%
Age						
20-24 years	61	14.4	27	15.0	88	14.5
25-29 years	128	28.8	63	35.0	191	31.6
30-34 years	47	10.6	11	6.1	58	9.6
35 years or older	<u>189</u>	<u>44.5</u>	<u>79</u>	<u>43.9</u>	<u>268</u>	44.3
Total	425	100.0	180	100.0	605	100.0
Gender						
Male	298	67.9	135	68.2	433	68.0
Female	141	32.1	63	31.8	204	32.0
Total	439	100.0	198	100.0	637	100.0
Marital Status						
Married	282	64.8	115	57.2	397	62.4
Single	145	33.4	76	37.8	221	34.8
Divorced	<u>8</u>	<u>1.8</u>	<u>10</u>	<u>5.0</u>	<u>18</u>	2.8
Total	435	100.0	201	100.0	636	100.0

Table 2 Highest Degree Attained and Certification of Graduates Interested in Taking Courses Through Distance Education and Graduates Not Interested

Characteristic	f	%	f	%	f	%
<u>Age</u>						
<u>Highest Degree Attained</u>						
Bachelor's	269	62.0	120	60.9	389	61.6
Master's	148	34.1	64	32.5	212	33.6
Doctorate	14	3.2	11	5.6	25	4.0
Other	<u>3</u>	<u>.7</u>	2	<u>1.0</u>	<u>5</u>	<u>0.8</u>
Total	434	100.0	197	100.0	631	100.0
<u>Teaching Certification</u>						
Permanent	145	76.7	65	92.9	210	81.1
Provisional	21	11.1	2	2.9	23	8.9
Temporary	10	5.3	1	1.3	11	4.2
Other	<u>13</u>	<u>6.9</u>	2	2.9	<u>5</u>	<u>5.8</u>
Total	189	100.0	70	100.0	259	100.0

Table 3 Intercorrelations Among Selected Graduate Variables and Interest in Distance Education

	VI	V2	V3	V4	V5	V6	V7	V8	V9
Age (V1)	--								
Attitude (V2)	.00	--							
Certificate (V3)	-.42*	.10	--						
Degree (V4)	.46*	.11	-.17*	--					
Gender (V5)	-.19*	-.05	.17*	-.03	--				
Graduate Type (V6)	-.67*	-.07	.16*	-.36*	.21*	--			
Income (V7)	.41*	-.03	-.27*	.31*	-.16*	-.41*	--		
Marital Status (V8)	-.50*	.03	.15*	-.28*	.13*	.46*	-.47*	--	
Distance Education Interest (V9)	-.05	.44*	-.18*	.01	-.00	.09*	-.05	.07	--

Notes.

Codes:

Age (0 = Below 30 years, 1 = 30 years or older).

Gender (0 = Female, 1 = Male).

Marital status (0 = Not married, 1 = Married).

Certification (0 = Not certified, 1 = Certified -permanent).

Highest degree (0 = Bachelor's, 1 = Advanced degree).

Household income (0 = Below \$50,000, 1 = Above \$50,000).

Graduate type (0 = Non-agriculture teacher, 1 = Agriculture teacher)

Graduates' attitude expressed as interval data.

Distance education (0 = Not Interested, 1 = Interested)

Coefficients: Phi coefficients express relationships between nominal variables; Point biserial coefficients express relationships between nominal and interval variables.

* $p < .05$

Table 4 Discriminant Analysis Model to Classify Agriculture Graduates as Interested or Not Interested in Distance Education

Function Derived	Eigen Value	Canon. R	Wilks' Lambda	Chi Square	Sig.
Interest in Distance Education	.29	.48	.77	59.35	.00

Variables Comprising Discriminant Function

Variable	F to Enter*	Wilks' Lambda Coefficient	Stand. Discrim.
Attitude Toward Distance Education	60.18	.78	.95
Certification	24.55	.77	-.29

Note. $df = 1, 232; p < .05$

Table 5 Results of Predicting Group Membership Based on the Significant Discriminating Variables
Predicted Group Membership

Actual Group (f)	<u>Interested</u>		<u>Not Interested</u>	
	f	%	f	%
Interested in distance education (188)	130	69.1	58	30.9
Not interested in distance education (70)	19	27.1	51	72.9

Note. Percent of cases predicted correctly = 70.16%

Table 6 Conditions for Graduates to Participate in Courses Delivered by Distance Education

<u>Distance Education Condition</u>	<u>Yes</u>		<u>No</u>	
	f	%	f	%
Will drive to downlink site	356	80.9	84	19.1
Prefer to study on my own	329	76.7	100	23.3
Prefer to work at own pace	295	69.2	131	30.2
Will take courses each semester	277	66.4	140	33.6
Prefer to interact with other students	169	39.3	261	60.7

Note. Mean number of miles = 24.78. Mean number of courses = 1.53.

Discussion and Conclusions

A majority of the graduates expressed interest in taking courses delivered through distance education. Thus, it can be concluded that a potential demand exists for colleges of agricultural sciences to deliver courses to graduates. Most graduates who would take courses would do so for professional development and then for an advanced degree. Such interest in participating in

courses delivered through distance education was supported by Gibson (1992) who found that adults tend to choose educational options that allow them to meet their employment, family, and educational obligations.

The discriminant analysis procedure identified attitude toward distance education and having or not having teacher certification as the most distinguishing factors in predicting interest in

participating in courses delivered through distant education. Intercorrelations between selected variables indicate a positive relationship between attitudes and interest in pursuing courses through distance education and a negative relationship between having certification and interest. Thus, it can be concluded that graduates with positive attitudes toward distance education would be more inclined to consider taking courses using this approach. Graduates with teacher certification, however, would be less likely to take courses offered through distance education. Graduates were mostly interested in professional development activities and advanced degrees and less interested in taking courses for certification. The findings indicate that a majority of the graduates who were teaching already had certificates and most of the other graduates had only bachelor's degrees. The lack of interest in certification by graduates suggests that those who are not teaching probably do not want to teach. This finding was also supported by the results of the discriminant analysis. The procedure provided insights into factors that are likely to influence interest in taking courses through distance education. Type of certification and attitude toward distance education were identified as the best indicators of interest in taking courses by distance education. Individuals are more likely to participate in activities when they have a positive attitude toward it and vice versa. The high interest in taking courses for professional development confirms the observation by Apps (1992) that adults are increasingly participating in educational programs to enhance their employment skills.

The fact that graduates with employment and family obligations are interested in taking courses through distance education has implications for agricultural education departments trying to meet their educational needs. Most graduates would take 1.5 courses per semester, prefer to work on their own, and at their own pace. Nearly all graduates expressing these preferences were employed. Thus, it can be concluded that graduates in the survey fit the profile of the adult

learner established by Gibson (1992). Verduin and Clarke (1991) also noted that the schedules of adult learners conflict with the schedules of working adults and they often turn to distance education as a more viable option.

Given the different requirements of adult students, educational institutions should devise new ways to satisfy the needs of adult students (Gibson 1992). Programs designed for adult learners with family and job responsibilities require flexibility in terms of scheduling, pacing of courses, course load, and place of instruction. Higher education institutions should incorporate approaches for meeting these needs. For example, The Pennsylvania State University's elimination of residency requirements for professional master's degrees and certificate programs (Penn State Graduate Council, 1997) is an effort by a higher education institution to provide flexibility and enhance the participation of graduates in courses offered through distance education. Providing flexibility to distant students may also require institutions to allow distant students to take courses from several institutions. Allowing distant students to take more courses from other institutions raises issues about the quality of courses that the home institution will accept. Institutions and students are faced with the responsibility of ensuring that courses are from reputable institutions and making sure the quality is acceptable. Institutions also have to consider the number of credits students will be allowed to transfer from other institutions. Currently, such a requirement limits the options available for students who want to enroll in distance education courses offered by most institutions.

Recommendations

The following recommendations are made based on the findings of the study:

1. Interested agricultural and extension education departments and colleges of agricultural sciences should develop

courses to be delivered to graduate students through distance education.

2. Distant students should be given the chance to work at their own pace and not be tied to the same semester period as is the case with on-campus students. Departments and colleges should require a period within which a particular course has to be completed, but they should not insist on a cohort of students completing a course at the same time.
3. Departments and colleges should allow students to take courses from other institutions provided they can ensure that the quality of programs is at par with their own.
4. Departments and colleges should explore increasing the number of credits distant students are allowed to transfer from outside institutions to their home institutions.
5. Students should be allowed to complete assignments on their own time. However, distant students should be subjected to the same academic requirements and standards as on-campus students.

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