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### Abstract

Distance education is a useful tool for agricultural and extension education departments in the delivery of courses to students. However, faculty, instructional designers, and agricultural communicators must understand the needs of learners in order for courses to be effective. A mail survey was conducted to assess the demand by agricultural science graduates for courses delivered by distance education and their skills and experiences in using distance education technologies. The majority of agricultural science graduates were interested in taking courses by distance education for professional development and advanced degrees. Few graduates had experiences with distance education but most were familiar with most of the distance education technologies.

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### Abstract

Distance education is a useful tool for agricultural and extension education departments in the delivery of courses to students. However, faculty, instructional designers, and agricultural communicators must understand the needs of learners in order for courses to be effective. A mail survey was conducted to assess the demand by agricultural science graduates for courses delivered by distance education and their skills and experiences in using distance education technologies. The majority of agricultural science graduates were interested in taking courses by distance education for professional development and advanced degrees. Few graduates had experiences with distance education but most were familiar with most of the distance education technologies.

Communications technologies are enabling educators to deliver courses and programs to students at a distance, but these efforts will not succeed unless the skills, characteristics, and interests of learners are considered in the design of such approaches. According to Kemp et al. (1994), a measure of the success of educational programs is whether or not learning is accomplished. Learners are the most important stakeholders in distance education approaches because they are the recipients of instruction, and programs will not succeed unless stakeholders' needs are satisfied. Consequently, so-

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cial, economic, and psychological factors that influence the learning of distant learners must be understood if programs are to be effective (Granger, 1991).

According to Granger, questions arise when trying to shape learning opportunities for distant learners. To be effective, educators and communications specialists must address questions about what needs to be known about learners; how such information can be gained in a way that is appropriate to the program; how such knowledge can be used to facilitate learning; and who should use the information. Distance educators must develop learner profiles and incorporate them into the design and delivery of programs. Such information can also be used to provide support services such as counseling, academic advising, and tutoring. According to Kemp et al., (1994), one of the key elements of the instructional design process is learner characteristics that can impact the quality of instruction. Thus, Moller (1991) suggests that an audience analysis include:

1. motivation,
2. optimal learning style,
3. reading comprehension level,
4. existing and prior knowledge of the topic,
5. program expectation,
6. familiarity with distance learning,
7. experience and ability with the hardware, software and technology,
8. time commitment and availability, and
9. educational level and experience.

Kemp et al. (1994) also suggest considering interest, age, and maturity level of learners among other factors.

In a related study, Park and Gamon (1996) found relationships between the learning styles of extension personnel and their preferences for specific educational technologies. Also, Rollins (1990) found a relationship between learning styles and student preferences for learning activities. In both of these studies, the authors recommended that extension educators match participants' learning styles and their preferences for learning activities and approaches. Further,

Bielema (1997) identified personal attributes such as living in a rural area, family responsibilities, and lack of computer experience as barriers to students' use of computer mediated communication for instruction. However, even with these apparent limitations, most colleges of agricultural sciences have the technologies and infrastructure to deliver various types and levels of distance education (Bowen & Thomson, 1995; Swan, 1995; Nti & Thomson, 1996; Miller, 1997).

Learners in distance education programs also have significant roles and responsibilities. In a typical distance learning situation, the teacher is only one of many resources accessible to the learner. Teachers serve as facilitators who link learners to resources while learners have the responsibility of using these resources to satisfy their educational needs. For instance, distance education often requires the use of telecommunications technologies that learners may not be familiar with yet require specific skills to use. Telecommunications media also alter the dynamics of the classroom and impose protocols that students need to master to be successful in a distance education course (Gunawardena, 1992). In such a course it is important that student roles and responsibilities be recognized so learners can be adequately prepared to assume them. However, Miller and Carr (1997) found a high need among agricultural faculty for distance-education-related training, including student roles and responsibilities.

In summary, many authors have stressed the importance of knowing the characteristics, skills, and experiences of participants to take courses and programs through distance education. Such knowledge will be useful to faculty, distance education personnel, instructional designers, and communications technologists in colleges of agricultural sciences in planning courses and programs for distant learners. However, few studies have assessed whether or not potential participants have the skills and experiences to participate effectively in courses and programs delivered through distance education. In this study, learner characteristics related to age and maturity; familiarity with distance education; experience and ability with the hardware; software and technology; educational level; and experience are examined as they impact the delivery of distance education courses and programs to potential participants who have bachelors' degrees in the agricultural sciences.

## **Purpose and Objectives**

The primary purpose of this study was to assess the demand by agricultural science graduates for courses and programs delivered through distance education. A secondary purpose was to assess the graduates' skills and experiences in using distance education technologies. The objectives were to:

1. Determine agricultural science graduates' interest in taking courses and programs through distance education.
2. Describe the characteristics of graduates who are interested in participating in courses and programs using distance education and those not interested.
3. Identify the types of educational experiences graduates are interested in completing.
4. Identify graduates' skills in using educational technologies.

## **Population and Sample**

The population consisted of students who graduated with bachelors' and/or masters' degrees in agriculture-related disciplines in the eastern region of the United States between the 1992 and 1996 academic years. The study focused on individuals who have graduated because as adults with work and family responsibilities, they will be less able to enroll in residential programs and more likely to seek alternative means for accomplishing their educational objectives. Lists of graduates who received bachelors' degrees in agriculture were used as the frame for sampling. The lists were obtained through the academic program deans and college alumni associations of 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). The population of graduates was 5,547. A random sample of 824 graduates was selected for the study using a 3% sampling error (Krejcie & Morgan, 1970). Stratified sampling techniques were used to select an appropriate number of graduates from each state.

## **Instrumentation**

The researchers developed a questionnaire to elicit responses about:

1. interests of agriculture graduates in participating in courses and programs offered through distance education,
2. demographic data about the respondents, and
3. their skills and capabilities for using distance education technologies.

Response categories for interest were “yes” and “no.” Multiple response categories were used for items relating to skills for using distance education technologies.

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 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.

## **Data Collection and Analysis**

Data collection was conducted in three stages. The questionnaire, along with cover letters and business reply envelopes, was mailed to the 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 nonrespondents. Of the 824 copies of the questionnaire mailed to agriculture graduates, 368 were returned and 360 were usable (a 44% response rate). Once the data collection period ended, the authors checked to see if the high number of nonrespondents perhaps biased the findings. This precaution was warranted because the study sought to determine the interests that the 5,547 graduates in the region had in participating in distance education courses and programs.

To address this precaution, 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). Miller and Smith (1983) recommended this approach to assess nonresponse bias. Thus, the respondents were compared

on their age, gender, highest degree attained, and interest in enrolling in courses and programs delivered by distance education. The findings indicated that there were no significant differences ( $p > .05$ ) between the two groups on any of the four variables. Based on these findings, the authors concluded that the respondents were similar to the nonrespondents.

The Statistical Package for the Social Sciences version 6.1 (SPSS, 1995) was used to analyze all data. Frequencies, percentages, standard deviations, means, and chi-square procedures were used to analyze the data.

## **Findings**

*Objective #1: Identify agricultural science graduates' interest in taking courses and programs through distance education.*

Graduates were asked whether or not they would be interested in taking courses and programs offered through distance education. Demographic data were collected from all respondents including those who did not express an interest in taking courses and programs through distance education. Two hundred, thirty-three (64.7%) of the 360 respondents expressed interest in taking courses and programs offered through distance education.

*Objective #2: Describe the characteristics of graduates interested in taking courses and programs by distance education.*

Graduates who expressed interest in taking courses and programs through distance education were compared on selected characteristics with those who were not interested to determine if there were appreciable differences between the two groups. Of the 209 male respondents, 139 (66%) were interested while 91 of 144 females (63%) were interested in taking courses and programs by distance education. Of the 230 graduates who were interested, 60% were males, the same percentage of males in the sample (See Table 1). More of the graduates who were interested were single (54.7%) compared with those not interested (50.0%). There were few differences in the educational levels of the graduates based on their interest in taking courses and programs through distance education (Table 2). Slightly over three-fourths of the graduates (77.3%) had only bachelors' degrees, 19% had masters' degrees, and two had earned doctoral degrees.

Even though there were some differences between graduates who were interested in taking courses and programs through distance education and those not interested, a chi-square procedure performed on these demographic variables did not reveal any significant relationships ( $p > .05$ ).

**Table 1** *Graduates' Interest in Taking Courses Through Distance Education by Age, Gender, and Marital Status*

| Characteristic               | Interested |       | Not Interested |       | Total |       |
|------------------------------|------------|-------|----------------|-------|-------|-------|
|                              | f          | %     | f              | %     | f     | %     |
| <b><u>Age</u></b>            |            |       |                |       |       |       |
| 20-24 years                  | 56         | 25.8  | 26             | 24.5  | 82    | 25.4  |
| 25-29 years                  | 110        | 50.7  | 58             | 54.7  | 168   | 52.0  |
| 30-34 years                  | 25         | 11.5  | 9              | 08.5  | 34    | 10.5  |
| 35 years or older            | 26         | 12.0  | 13             | 12.3  | 39    | 12.1  |
| Total                        | 217        | 100.0 | 106            | 100.0 | 323   | 100.0 |
| <b><u>Gender</u></b>         |            |       |                |       |       |       |
| Male                         | 139        | 60.4  | 70             | 57.0  | 209   | 59.2  |
| Female                       | 91         | 39.6  | 53             | 43.0  | 144   | 40.8  |
| Total                        | 230        | 100.0 | 123            | 100.0 | 353   | 100.0 |
| <b><u>Marital Status</u></b> |            |       |                |       |       |       |
| Married                      | 98         | 43.5  | 51             | 44.0  | 149   | 43.7  |
| Single                       | 123        | 54.7  | 58             | 50.0  | 181   | 53.1  |
| Divorced                     | 4          | 01.8  | 7              | 06.0  | 11    | 03.2  |
| Total                        | 225        | 100.0 | 116            | 100.0 | 341   | 100.0 |

**Table 2** *Graduates' Interest in Taking Courses Through Distance Education by Degree*

| Characteristic          | Interested |       | Not Interested |       | Total |       |
|-------------------------|------------|-------|----------------|-------|-------|-------|
|                         | f          | %     | f              | %     | f     | %     |
| Highest Degree Attained |            |       |                |       |       |       |
| Bachelors'              | 178        | 78.0  | 94             | 75.8  | 272   | 77.3  |
| Masters'                | 40         | 17.5  | 23             | 18.5  | 63    | 17.9  |
| Doctorate               | 8          | 03.5  | 7              | 05.7  | 15    | 04.3  |
| Other                   | 2          | 01.0  | —              | —     | 2     | 00.5  |
| Total                   | 228        | 100.0 | 124            | 100.0 | 352   | 100.0 |

**Table 3** *Types of Distance Education Instructional Experiences Desired by Agriculture Graduates (f = 233)\**

| Reason for participation     | f   | %    |
|------------------------------|-----|------|
| Professional Development     | 192 | 83.5 |
| Obtain an Advanced Degree    | 29  | 12.6 |
| Secure Teacher Certification | 9   | 3.9  |

\*Note: Respondents could choose multiple responses.

*Objective 3: Types of educational experiences graduates were interested in completing*

Graduates who expressed interest in taking courses and programs offered through distance education were asked to indicate the types of instructional experiences they would be interested in pursuing. The categories were not mutually exclusive because graduates could choose three instructional experiences. Over 80% (192) were interested in professional development, 29 (12.6%) in advanced degrees, and nine (3.9%) in teacher certification (Table 3).

*Objective 4: Graduates' skills to use educational technologies*

To analyze the agriculture graduates' distance education experiences, the respondents were asked whether or not they had received any form of instruction delivered through distance education, the types of instructional experiences they had received, and the media used in those instructional experiences. The specified categories were not mutually exclusive and respondents could select as many categories as applied. A low number of graduates had received instruction through distance education. Among the 233 graduates who responded to this item, only 41 (14.8%) had received instruction through distance education. Thus, 186 (67.2%) graduates had not received any instruction through distance education.

To gain additional insight, graduates who had received distance education instruction were asked about the types of experiences they had received. Response categories were not mutually exclusive and graduates could choose as many categories as applied. Among the 41 graduates who had received instruction through distance education, a relatively high number (26) had participated in semester length courses and programs, six in workshops, seven in seminars, and two had participated in some other form of distance education instruction. In terms of media used in the instructional experiences, the most frequently mentioned were mail (32), print (13), telephone (10), and videoconferencing (9). Table 4 lists media used in the distance education experiences of these 41 graduates.

Regardless of their instructional experiences with distance education, a majority of agriculture graduates indicated that they were comfortable using many of the media typically used in distance education instructional delivery (Table 5). The most frequently mentioned media were mail (213), computer disk (181), print (178), and fax (173). The least mentioned media were compressed video (44), satellite (42), and audiographics (16).

## **Discussion**

The findings indicated high interest by agriculture college graduates in the eastern region in taking courses and programs through distance education. Such interest matches the findings of a related study of adults. Gibson (1992) found that adults tend to choose educational options that allow them to meet their employment, family,

| <b>Table 4</b> <i>Media Used in Graduates' Distance Education Experiences (f=41)*</i> |          |          |
|---|----------|----------|
| <b>Medium</b>   | <b>f</b> | <b>%</b> |
| Mail  | 32       | 78       |
| Print   | 13       | 32       |
| Telephone   | 10       | 24       |
| Videoconference   | 9        | 22       |
| Satellite   | 5        | 12       |
| Audio Tapes   | 5        | 12       |
| Electronic Mail   | 5        | 12       |
| Fax   | 4        | 10       |
| Compressed Video  | 3        | 7        |
| CD-ROM  | 3        | 7        |
| Audioconference   | 3        | 7        |
| Broadcast TV  | 2        | 5        |
| Other   | 2        | 5        |
| Cable TV  | 1        | 2        |
| Computer Disk   | 1        | 2        |
| Radio   | 1        | 2        |
| Note* - respondents could choose multiple categories.                                 |          |          |

and educational obligations. The fact that graduates with employment and family obligations were interested in taking courses and programs through distance education has implications for colleges of agricultural sciences. Verduin and Clarke (1991) found that the schedules of adult learners tend to conflict with the schedules of working adults. Consequently, adults often turn to distance education as a viable option to meet their educational objectives.

In this study, few graduates had experiences with distance education, but most indicated that they were familiar with many of the media typically used in distance education instruction. This finding

**Table 5** *Distance Education Media Graduates Are Comfortable With (f=233)*

| Medium           | f   | %  |
|------------------|-----|----|
| Mail             | 213 | 91 |
| Computer Disk    | 181 | 78 |
| Print            | 178 | 76 |
| Electronic Mail  | 173 | 74 |
| Fax              | 168 | 72 |
| Telephone        | 166 | 71 |
| Cable TV         | 159 | 68 |
| CD-ROM           | 150 | 64 |
| Audio Tapes      | 152 | 65 |
| Broadcast TV     | 127 | 54 |
| Radio            | 108 | 46 |
| Videoconference  | 96  | 41 |
| Audioconference  | 76  | 33 |
| Compressed Video | 44  | 19 |
| Satellite        | 42  | 18 |
| Audiographics    | 16  | 7  |

*\*Note - Respondents could choose multiple categories.*

could reflect the fact that they are using some of the technologies on their jobs and possibly at home. Graduates also had access to most of the technologies needed to complete distance education courses and programs. Access to these technologies could have influenced their willingness to consider taking courses and programs through distance education. The fact that graduates have access to some of the technologies used in distance education programs should be helpful to college of agricultural science faculty and instructional designers who develop programs for distance delivery. However, few graduates had used these technologies in instructional situations and

the use of these technologies for instruction might require a different set of skills. Also, most of the graduates who had participated in distance education indicated that they had received instruction through print. The frequent mention of print is not surprising because it tends to be combined with other media and respondents in this study could select more than one type of technology.

## **Conclusions and Recommendations**

The findings in this study of recent agriculture graduates in the eastern region documents a need for colleges of agricultural sciences in the region to deliver distance education courses and programs. Also, because only recent agriculture graduates were studied, the level of interest in this type of instruction is perhaps underestimated. No attempt was made to assess the interest that older graduates as well as nonagriculture graduates have in enrolling in such instruction. Given this scenario and the findings for recent agriculture graduates in the eastern region, the following conclusions and recommendations were made.

1. There is an opportunity for instructional designers and agricultural communicators to help faculty deliver courses and professional development programs to agriculture graduates and other potential students. Special attention should be paid to developing professional education programs. For this to occur on a level that makes effective use of available resources, instructional designers and agricultural communicators should work with faculty to design courses and programs that use technologies that students have access to and with which they are comfortable.
2. Faculty and support personnel who assist with the instructional process should educate potential students about the process of distance education before programs are delivered because most graduates in the region have limited experiences with this type of instruction.
3. To achieve recommendation #2, agricultural communicators should develop training activities for students on common distance education technologies before they are allowed to enroll in distance education courses and programs. This training will enable students and faculty to focus on the substance of the instruction rather than the technologies being used to deliver the courses and programs.

4. Agricultural communicators should assist faculty in accurately assessing potential students' skills during the development of courses and programs delivered via distance education. Also, for students to handle technical problems effectively that might occur during the delivery of instruction, technology support personnel and faculty should provide students the needed computer and other technical skills.

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