

Distance Education: A Synthesis of Research from Agricultural and Extension Education



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Abstract

The purpose of this investigation was to synthesize the distance education research from the agricultural and extension education researchers to provide a single source of information for practitioners, administrators, and researchers. The *Journal of Agricultural Education*, *Journal of Extension*, *Dissertation Abstracts International*, and *Proceedings from the National Agricultural Education Research Conference/Meeting* were used as sources for this study. This was deemed appropriate, as they are the primary outlets for educational researchers in the context of agriculture. The research synthesized in this study was conducted by researchers in agricultural and extension education and examined a variety of agricultural distance education, ranging from technical subjects such as soils, to more social subjects such as education. Research was synthesized into three areas: planning, instruction, and evaluation. In the area of planning, research indicated faculty need training, technical support, administrative support, and incentives. Students' needs were: time to devote to coursework and a variety of delivery methods. In the area of instruction, research indicated that student/instructor and student/student interaction are concerns of both faculty and students. In the area of evaluation, off-campus courses are generally not perceived to be as effective by faculty, while students reported mixed perceptions.

Introduction

Distance education has become commonplace on many university campuses throughout the United States. As of 1998, 54% of all higher education institutions either offered or planned to offer distance education courses (Lewis et al., 2000). Additionally, nearly 10% of all college students in the United States have taken distance education courses, defined in this report as being strictly off-campus,

which included video conferencing, internet, videotape and other technologies used when students take courses off-campus (Sikora, 2002). Delivering coursework to students that are off-campus has also become common in Colleges of Agriculture across the country. As a result, researchers have studied many associated areas of agricultural distance education.

Materials and Methods

The purpose of this investigation was to synthesize the agricultural distance education research from the last decade to provide a single source of information for practitioners, administrators, and researchers. Four sources were used to gather data to meet the objectives of this study. They were the *Journal of Agricultural Education*, *Journal of Extension*, *Dissertation Abstracts International*, and *Proceedings from the National Agricultural Education Research Conference/Meeting*. Relevant research published from 1990 to 2003 was used in this study. In total, 58 articles were examined (Figure 1). Examining distance education holistically, findings were grouped based on relevance to the planning, instruction, or evaluation of distance education.

Results and Discussion

Planning

While planning for distance education, faculty members generally perceived a need for training, technical and administrative support, and incentives. Nti (1997) reported that institutional policy, distance education skills, and a need for assistance all affected faculty interest in using distance education. Born and Miller (1999) found that 40% of the faculty members were not familiar with distance education programs. For distance education diffusion to take place, Murphrey and Dooley (2000) reported that faculty perceived a need for administrative support, training, and incentives. They also found that faculty members expressed a need to expand policies that address

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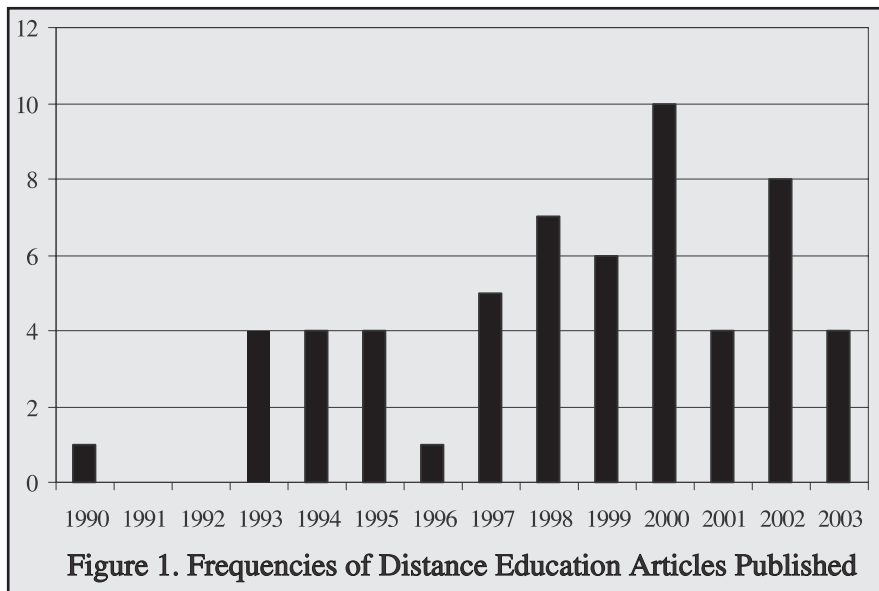


Figure 1. Frequencies of Distance Education Articles Published

incentives, support, training, quality control, careers, and communication. Similarly, Murphy and Terry (1998a; 1998b) reported that lack of time, faculty reward system, and technical support were obstacles to distance education. Additionally, Swan (1993) and Swan and Brehmer (1994) cited negative attitudes of faculty, technophobia, and lack of faculty training as obstacles. To address these obstacles, Jackson (1993; 1994), along with Jackson and Bowen (1993), found six incentives that encourage other faculty to get involved in distance education. The incentives were recognition from administrators, availability of funds to produce courses, opportunities to reach more people, widespread demand for a topic, adequate support staff, and the time to plan and deliver a course.

Needs of faculty may vary from situation to situation. Murphy and Dooley (2001) noted that over a five-year period, the primary concern of faculty members shifted from access to technical resources to a need for training and technical support. Many studies support the need for more faculty training in distance education to be able to use the technology (Miller, 1997a; Miller and Miller, 1998; Murphrey and Dooley, 2000; Murphy and Dooley, 2001; Murphy and Terry, 1998a). Furthermore, faculty also perceived a lack of access to equipment and facilities (Murphy and Terry, 1998b). Dooley and Murphy (2001) reported that faculty believed that training and assistance were less available than access to equipment. Additionally, Miller and Miller (1998) found that faculty have a need for additional preparation time for a distance education course.

In addition to faculty needs, distance education students also had needs and concerns that should be addressed during planning, which included: a limited amount of time to devote to coursework, a desire for advanced degrees, and a need for a variety of delivery methods. Several researchers reported that students felt that off-campus courses are fulfilling important educational needs (Miller and Pilcher, 2000b).

Additionally, Miller and Pilcher (2000b) found that students agreed that off-campus courses were adjusted to meet student needs. Interestingly, Miller (1995) examined student learning styles and showed that field-dependent learners had a more positive attitude than field-independent learners toward interactive video delivered instruction, when compared to videotaped instruction.

Distance education offered several benefits that should be considered when planning for distance education. In a study of in-service training, respondents reported that a benefit of distance education is that it reduced the time required, while meeting their needs

for professional development and face-to-face contact (Kelsey and Mincemoyer, 2001). Similarly, Jackson et al. (1995) found that extension agents preferred self-paced videos to address their time constraints. Swan (1998) concluded that the majority of high school students enrolled in a variety of distance education classes benefited by the opportunity to take these classes that could not have been taken if not offered at a distance. Additional benefits of courses taught through distance technologies included the access to national experts and the ability to make research applications relevant to learners who are geographically dispersed (Dooley et al., 2000). Learners are interested in education via distance education for various reasons (Murphrey and Boyd, 2000; Nti, 1997; Nti and Bowen, 1998). Nti and Bowen (1998) reported that agricultural science graduates were most interested in taking distance education courses for professional development activities and to obtain advanced degrees. Wilson and Moore (2002) examined factors that contribute to enroll in a distance delivered Master's degree program. Results indicated that undergraduate GPA, years of experience, occupation, need for courses to continue employment, and administrative support contributed to predicting enrollment.

Another dimension helpful in planning for distance education is knowledge the practices of other departments. Roberts and Dyer (2003) examined the distance education practices in a national census of agricultural education departments. Results indicated that two-thirds of the departments offered distance education courses, offered most frequently at the graduate level. Each department had an average of three faculty who taught distance education courses and primarily used course management software (WebCT, Blackboard, etc.) as the delivery method. Roberts and Dyer (2003) also indicated the biggest motivating factor for offering distance education courses was providing better

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service to clientele, while the biggest barrier was faculty time constraints.

Instruction

Instruction involves an interaction between content, students, and instructors. In a distance-learning environment, interaction also involves technology. Student/instructor and student/student interaction were commonly perceived by faculty members to be problems in courses taught at a distance. Interaction between the student and the professor was found to be the largest concern of faculty surveyed by Born and Miller (1999). Other research has shown that faculty perceive limited interaction with off-campus students, and that off-campus students contributed less to class (Miller and Pilcher, 2000a). Similar studies showed that 87% of the surveyed faculty members perceived that student/instructor and student/student interaction was lower for off-campus students (Miller and Pilcher, 2000b; Miller and Shih, 1999a). These same studies showed that faculty members felt they were less available to help off-campus students (Miller and Pilcher, 2000b; Miller and Shih, 1999a). Another survey of faculty members revealed that faculty perceived replacing face-to-face interaction with interaction through technology was impossible (Murphrey and Dooley, 2000). D'souza and Kelsey (2003) reported mixed results. Faculty perceived that technology was a barrier to instruction, while students perceived the technology as manageable.

The literature base suggests that distance educators should be more concerned about the interaction needs of their students. Miller and Webster (1997) suggested that there are differences in the needs of learners, and that while the needs of synchronous (interactions occurring at the same time) and asynchronous (interactions occurring at different times) learners were generally similar, their needs vary on individual items. Miller and Webster (1997) also reported that learners taking the course asynchronously did not perceive interaction to be as important as the learners taking the courses synchronously. Jackson et al. (1995) suggested that educational programs that require immediate student/instructor interaction should consider using interactive audio/video systems.

Students in distance education classes often perceived that there was less interaction in off-campus courses. Several studies revealed that students perceived the amount of student/student and student/instructor interaction to be much less in off-campus courses as compared to on-campus courses (Miller and Pilcher, 2000a; 2000b). Miller (1997b) found that students enrolled in videotaped courses engaged in low levels of interaction. As a group, these learners rarely studied with other learners and rarely called the instructor.

Interaction may be a necessary component of distance education courses. King and Doerfert (1995)

found that students needed personal contact with the instructor, regardless of delivery method. King and Doerfert (1995) also found that to a lesser extent, students needed interaction with other students. Similarly, Miller and Crawford (1990) found that students were more socially motivated and needed student/student and student/instructor interaction.

Interaction may be accomplished several ways. Murphy (1999) found that five instructors increased the amount of student interaction through the use of technology while student interaction decreased for other instructors. Murphy (1999) also noted that through the use of electronic communication technologies associated with distance education, interaction with students at remote sites was equal to or greater than that of on-campus students. The reported key to interaction with off-campus students was the instructor's interaction with the technology.

Some distance delivery technologies appeared to be effective in promoting interaction. In a study comparing distance education via satellite and face-to-face delivery methods for extension training, Rost (1997) found little or no difference in the amount of interaction that took place during instruction. In a later study that compared interaction levels of both traditional learning environments and distance delivery via satellite, Rost (2000) reported that levels of interaction in the satellite-delivered classes were very close to that of the traditional settings when used to deliver master gardener training. These findings are consistent with those of Murphy (1999), who examined non-specified "scientific and technical courses in agriculture" and Swan (1995), who showed that interactive audio/video courses and traditional face-to-face courses were not fundamentally different in terms of levels of classroom interaction with a variety of high school classes. Rost (2000), however, indicated that students at remote sites engaged in significantly higher amounts of non-cognitive talk as compared to students who did not have the distance education technology placed between them and the instructor.

The type of interaction in distance education settings is important to the satisfaction of students. Gray and Miller (1999) reported graduate students ranked student/content interaction as most important, followed closely by student/instructor interaction. Kelsey (1999) reported that students enrolled in a seminar delivered via interactive compressed video (ICV) were very satisfied with the number and variety of opportunities for interaction. Interestingly, Beaudin (2000) found that extension agents preferred asynchronous interaction to synchronous interaction when using web-based technologies to deliver seminars and workshops. Hynes et al. (2003) examined patterns of interaction between female and male students in a course delivered asynchronously with no time constraints on completing assignments. Results indicated that females engaged the content earlier in the course and completed the course sooner,

while male students engaged the content longer. Interestingly, overall performance in the course was similar for males and females.

Research has also established that there are barriers to interaction in distance education. D'souza and Kelsey (2003) reported that both students and faculty were satisfied with the amount of interaction, although faculty reported some barriers to interaction. Kelsey (1999) identified ten barriers from students to interaction in a case study involving a seminar delivered with compressed video: social concerns, technology limitations, lack of time, content related issues, camera shyness, site facilitators' behavior, needing more time for processing content, lack of non-verbal clues, distance, and having to press the microphone mute control knob.

In an effort to examine how specific learning strategies affect learning in a distance education setting, Miller and Pilcher (2002) provided a videotape and bookmark that outlined six learning strategies to 110 students enrolled in a variety of distance education courses at Iowa State University. Results indicated that students responded favorably to the videotape and bookmarks, although performance, as measured by course grade, did not change.

Recognizing that writing skills are an important ability for graduate students, Murphy et al. (2002) compared agricultural education graduate students enrolled in distance degree programs and students enrolled in on-campus degree programs at Texas A & M University, Texas Tech University, and Oklahoma State University. Results indicated that there were no differences in writing ability, regardless of whether taking the class on-campus or off-campus, or at which university students were enrolled.

Evaluation

Many researchers have studied the outcomes of distance education. Several studies indicated that faculty members do not believe distance education courses to be equivalent to on-campus courses (Miller and Pilcher, 2000b; Miller and Shih, 1999a, 1999b). Additionally, Born and Miller (1999) noted that faculty do not believe that on-line degrees should be valued as equivalent to on-campus degrees. Likewise, Miller and Pilcher (2000a) reported that agricultural faculty members perceived on-campus courses to be superior in rigor. These same studies also showed that faculty members perceived that, for the same grade, off-campus students were not expected to achieve at the same level as on-campus students (Miller and Pilcher, 2000a). Miller and Shih (1999a) noted that faculty also perceived that off-campus courses were lower in manufacturing and transcendent based quality factors. Manufacturing quality was defined as meeting specific process specifications and transcendent quality was described as innate excellence (Miller and Shih, 1999a).

Miller and Pilcher (2001) reported that instructors desire to teach to the same level of cognition in

on-campus and off-campus. The researchers also reported that the delivery method used in distance education seemed to affect the cognitive level of instruction. For example, two-way audio/two way video was better than videotape, a combination of video conferencing/videotapes, and a combination of videotapes/live instruction (Miller and Pilcher, 2001). Miller and Shih (1999a) reported that faculty members perceive the difference between off-campus and on-campus courses to be very small in user-based and value-based based quality factors. This study also revealed that faculty perceive off-campus courses to be equal to or greater in relevance than on-campus courses, and that off-campus courses were better organized. Born and Miller (1999) reported that faculty perceive web-based distance education could be as challenging as on-campus courses.

A large body of research addresses the issue of equivalence from a student perspective. No studies of agricultural courses reported off-campus courses to be superior to on-campus courses. However, off-campus students felt distance education courses to be equivalent (Miller and Pilcher, 2000a; Rost 1997). Many studies conflict with these findings. For example, Miller and Pilcher (2000b) reported that, overall, off-campus students perceive off-campus courses to be of lower quality than on-campus courses. Interestingly, students were more positive in their responses towards the quality and rigor of off-campus courses than faculty members (Miller and Pilcher, 2000a, 2000b). Dooley and Lindner (2002) examined student learning in a graduate level distance education course by comparing competency-based behavioral anchors at the beginning and end of the course. Results indicated great variation at the beginning, but more homogeneity at the end.

When asked to evaluate on-campus and off-campus courses in terms of specific quality factors, off-campus students indicated that on-campus classes were superior in the transcendent-based and manufacturing-based quality factors (Miller and Shih, 1999a). Additionally, (Miller and Shih, 1999a) reported that on-campus and off-campus courses were equal in the value-based quality factor, defined as performance at an acceptable cost, and that off-campus courses were superior on the user-based quality factor, which was defined as user preferences.

The method of delivery may be important to student perceptions of course quality and rigor. Videotapes have been reported as a valid means of delivering distance education courses (Miller and Honeyman, 1993, 1994; Miller and King, 1994). Additionally, Swan (1995) found that students perceived that interactive video networks were an effective way to teach courses. Several studies have shown that students enrolled in courses taught using the World Wide Web combined with a laboratory achieved at a higher level of academic performance than students taught in a traditional classroom setting (Day et al., 1998; Newman et al., 1996). These

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findings were consistent with those of Boyd and Murphrey (2002) who found that students in a treatment group that involved the use of an asynchronously delivered simulation activity performed significantly better on course examinations than students in the control group on exam questions written at knowledge, comprehension, and analysis levels of Bloom's Taxonomy of learning. In contrast, Sexton et al. (2002) reported that when delivering in-service to Mississippi 4-H agents that agents who received the training in a traditional face-to-face format scored significantly higher at the application level of Bloom's taxonomy than agents who received training via the World Wide Web. Boyd and Murphrey (2002) concluded that computer-based simulations have the ability to improve student learning at higher cognitive levels.

Rudd and Telg (1998) reported conflicting findings from their study of students enrolled in one of two interactive video courses. The researchers found that in one of the courses, students at the host site had significantly higher grades than students at the remote site, while in the other class students at the host site earned lower grades, although not significant, than the students at the remote site (Rudd and Telg, 1998). Irani et al. (2000) suggested that performance of distance learners, as compared to on-campus students, is impacted positively by perceptions towards the distance technologies used. Dooley et al. (2003) compared synchronous (interactive video conferencing) to asynchronous (Web-based) delivery of a graduate course. Results indicated similarities in learning between the two groups. Dooley et al. (2003) concluded that the methods employed in teaching a class, not the media in which it is delivered, that is important in distance education.

In a study of high school students enrolled in courses taught using distance technologies, Swan (1998) found that there were no differences between the achievement of remote site and host site students in terms of their overall grade point average. These findings were consistent with those of Murphy (2000) who found no significant differences in student achievement between traditional, local, and distance students enrolled in an undergraduate general soils course. The traditional section was a typical on-campus face-to-face class, the distance section were students geographically separated who used video tapes, and the local section consisted of students on-campus who used the videotapes to receive instruction. No studies reported the perceptions of on-campus students toward the comparison of distance and face-to-face delivery methods.

In an evaluation of a total distance education degree program, the Doc@Distance program, offered jointly by Texas A & M and Texas Tech Universities, Kelsey et al. (2002) employed qualitative methodologies to examine student satisfaction. Results indicated that the 18 students enrolled were satisfied for

a variety of reasons, including instructional design, faculty, and cohort group design. They were dissatisfied by isolation, inaccessible resources, technology problems, and amount of time required.

Summary

For effective planning of distance education to occur for the use of distance education delivery methods, needs of both faculty and students must be met. Faculty members have a need for training, technical and administrative support, and incentives. Students need additional time to complete distance education coursework. Whether this need is perceived or real, distance education students are generally non-traditional and are generally full-time employees and part-time students (Sikora, 2002). An interesting implication of this finding is that instructors may need to develop different strategies for dealing with distance education and traditional students in the same class. Students also identified a need for a variety of delivery methods.

In courses where the students and instructors are separated and technologies are used for teaching, student/instructor interaction and student/student interaction were commonly perceived by faculty members to be problems. Students also perceived that there is less interaction in off-campus courses. Interestingly, the only study that actually measured interaction showed that interaction could be greater in off-campus courses (Murphy, 1999).

When evaluating distance education, faculty viewed on-campus courses to be superior to off-campus courses, however, off-campus students viewed the two as equal in overall quality and rigor. No studies reported distance education courses to be superior in quality.

Most of the research conducted to date has been based upon perceptions of various partners (students and faculty), with a majority of that research focused on perceptions of faculty. A need exists for empirical evidence that explores the various phenomena associated with distance delivered courses that go beyond perceptions of those involved.

As needs are constantly changing, studies should continue to assess the needs of both faculty and students associated with distance education. Additionally, because many distance education courses are now being offered exclusively web-based, further research needs to be conducted that adequately explores this delivery method.

Many of the existing studies offered conflicting findings with regards to interaction. Additional research should be conducted in this area to further investigate existing and required amounts of interaction in distance delivered courses.

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