

A COMPARISON OF DISTANCE EDUCATION COMPETENCIES DELIVERED SYNCHRONOUSLY AND ASYNCHRONOUSLY

Kim E. Dooley, Assistant Professor
James R. Lindner, Assistant Professor
Lance J. Richards, Graduate Assistant
Texas A&M University

Abstract

Little research in the agricultural education field has focused on the competencies needed to be successful as a distance education professional. The research presented in this paper compares two types of instructional methods (synchronous and asynchronous) for delivering a graduate course. This study was grounded in the qualitative research paradigm. The natural setting for this study was a 15-week graduate course delivered synchronously (ITV) in the spring of 2001 and asynchronously (Web-developed) in the spring of 2002. The purposive sample included 20 graduate students in the spring of 2001 (ITV) and 22 graduate students in the spring of 2002 (Web-developed). Comparisons indicated that there was similar learning of core distance education competencies regardless of delivery method, gender, degree, and major. This study further contributes to the notion that it is not the media, but the methods, that make a difference in distance education. Questions of efficiency and quality are critical for furthering this line of inquiry.

Introduction/Theoretical Framework

Buford and Lindner (2002) define competencies as a group of related knowledge, skills, and abilities that affect a major part of an activity such as going to school. Competency models can be used: as a student recruitment and selection tool; as a student assessment tool; as a tool to develop curricula and other teaching material; as a coaching, counseling, and mentoring tool; as a career development tool; and as a behavioral requirement benchmarking tool (Yeung, Woolcock, & Sullivan, 1996).

Little research in the agricultural education field has focused on the competencies needed to be successful as a distance education professional. Cyrs (1997) identified areas of competence important to distance education: course planning and organization, verbal and nonverbal presentation skills, collaborative teamwork, questioning strategies, subject matter expertise, involving students and coordinating their activities at field sites, knowledge of basic learning theory, knowledge of the distance learning field, design of study guides, graphic design, and

visual thinking. "It is not that the technology underpinning distance education drives the system but rather that fundamental changes in teaching style, technique, and motivation must take place to make the new 'classrooms' of the present and future function effectively" (Purdy & Wright, 1992, p. 4).

Based on a competency model developed by the American Society for Training and Development (ASTD), Thach and Murphy (1995) identified roles, outputs, and competencies of distance learning professionals within the United States and Canada. These competencies served as the constructs for the development of the graduate course used for the context of this study. Competency-based behavioral anchors were demonstrated to be effective tools for benchmarking and determining student growth in distance education competencies (Dooley & Lindner, 2002).

Competency-based behavioral anchors are defined as observable behaviors that demonstrate knowledge, skills, and abilities (competencies). Competency-based behavioral anchors require considerable time and effort to develop, however, they provide

more accurate judgments than item-based scales (Buford & Lindner, 2002). Further, such anchors provide teachers and other expert raters with behavioral information useful in providing assessments and feedback to students. Such information can help students better understand their unique bundles of competencies and increase student satisfaction, motivation, learning, and ultimately success in a course (Drawbaugh, 1972). Competency-based feedback based on behaviors can provide a foundation for student-centered learning plans. Behavioral anchors can also be used to describe minimally acceptable knowledge, skills, and abilities on identified core competencies, thus, giving teachers tools and information needed to improve curricula, teaching materials, evaluation processes, and instructional delivery methods (Lindner & Dooley, 2002).

Lindner and Murphy (2001) define distance education delivery methods as "those that permit any education received by the student to occur when the teacher and the student are separated by location and/or time" (p. 37). A variety of media can be used to bridge this separation. One example is the use of interactive television (ITV). Interactive television is highly visualized and interactive and requires students to participate in specially designed activities (Cyrs, 1997). Another media type for distance education is the Web. Courses delivered entirely on the Web are called Web-developed. Web-dependent courses have major content components on the Web, but rely also on other delivery methods. Courses that have auxiliary materials, links, additional reading, and support materials on the Web are referred to as Web-supported (Lindner & Murphy, 2001).

Findings of media comparisons have discovered that there are no significant differences between traditionally taught courses and distance delivered courses (Clark, 1983; Miller & Webster, 1997; Russell, 1999). Some researchers contend that all media are not created equal and that there is a need for specific media and method comparisons (Joy & Garcia, 2002). Instructors are limited by cost, time, interest in the subject matter, and their own knowledge of media. Designing a class for

distance education is more time consuming than creating a traditional class lecture due to additional planning and upfront preparation (Wolcott & Betts, 1999).

There is also a need to compare delivery methods based upon gender, degree sought, and academic preparation. In the book *Tech-Savvy: Educating Girls in the New Computer Age* (American Association of University Women Educational Foundation, 2000), concerns were raised about access for females to distance education technologies and opportunities for full citizenship in contemporary e-culture. These concerns highlight the need for research on distance education competencies based upon gender. Little is known about whether, there are discrepancies between master's and doctoral level students. Would doctoral students have more maturity and academic preparation and therefore be more successful with self-directed or asynchronous strategies than Master's students? Moreover, do graduate students within the department of agricultural education (where technology-assisted learning is prevalent) fare better than their counterparts in other departments and colleges?

Clark (1983) in a foundational study wrote that regardless of media format, student learning would be consistent. He further suggested that the instructional method might result in different levels of learning. More recently and within the field of agricultural education, Miller and Webster (1997) compared interaction needs and performance of distance learners in synchronous and asynchronous classes. The research presented in this paper is an attempt to describe if two types of instructional methods (synchronous and asynchronous) for delivering a graduate course will result in different levels of learning. Clark hypothesized that even if no differences in effectiveness exist, efficiencies may be gained through use of asynchronously delivered courses. Napierkowski (2001) suggested that including synchronous components in course delivery would result in more effective learning.

Course Descriptions

The research for this study was conducted within the context of a graduate

course taught in the Department of Agricultural Education at a Land Grant institution. The course was taught in the spring semester of 2001 using interactive video (ITV) with web-supported features (synchronous). The course was re-designed as a Web-developed course using WebCT (asynchronous). The content for the course was developed based upon the competencies for the distance education professional (Thach & Murphy, 1995). The researchers clustered the distance education competencies into six major themes or "core" competencies needed by practitioners: adult learning theory, technological knowledge, instructional design, communication skills, graphic design, and administrative issues (Dooley & Lindner, 2002).

The synchronous course (ITV) was taught in a similar fashion to a face-to-face course (Gagné, Briggs, & Wagner, 1992), but best practices for teaching over television were incorporated (Cyrs, 1997). There were brief introductions to the lessons (icebreakers or openers), short lectures using PowerPoint graphics, small group exercises (concept mapping, brainstorming, case studies, etc.) and then independent readings and assessment techniques to determine if the students fully understood the content. The instructor was very comfortable teaching over ITV and understood how to use all features of the equipment to build interaction and rapport with the learners. Students were required to create or modify a lesson into a distance education format (ITV, print, web, CD-ROM, etc.) as their final project.

The asynchronous course was designed to be competency-based, rather than relying on more traditional "contact hours." The course was broken down into five modules with several lessons within each module. Students interacted in cooperative learning teams. Although the course was asynchronous, the instructor expected students to interact within the same week on particular content areas. For example, students created icebreakers/openers and posted them on WebCT and students in the cooperative learning team participated. Each learner also designed or modified a lesson to distance education delivery. At the

end of the semester, the learners acted as "students" to one another by interacting with the on-line lessons and completing the evaluation and assessment measures to provide feedback on the design.

Research Questions and Propositions

The purpose of this study was to describe and authenticate growth (learning) in distance education core competencies of two groups of students taking a 15-week graduate course, *Advanced Methods in Distance Education*. The research questions were: 1) How much growth in core competencies did learners demonstrate as a result of the course? 2) Will students taking the course synchronously demonstrate more growth than student taking the course asynchronously? 3) Will there be differences in growth based upon personal characteristics (gender, department, or degree sought)?

Methods

This study was grounded in the qualitative research paradigm. The natural setting for this study was a 15-week graduate course delivered synchronously (ITV) in the spring of 2001 and asynchronously (Web-developed) in the spring of 2002. The purposive sample included 20 graduate students in the spring of 2001 (ITV) and 22 graduate students in the spring of 2002 (Web-developed) for a total of 42 respondents. There were 20 females and 22 males enrolled over both semesters. Respondents were coded based upon gender, degree, department, and with a number as a unique identifier to determine any trends in the data, but still provide confidentiality.

The course instructor had weekly participant observation and interaction with the learners (prolonged engagement). One of the researchers was the instructor for the course, while the others served as peer debriefers, methodologists, and data interpreters.

The assessment instrument was developed by Dooley and Lindner (2002) and has been found to be credible and transferable. The instrument was used as a

tool for the students to measure growth (learning) in the six core competencies. The researchers chose a stair-step approach (rather than a continuum or Likert scale) to visually represent progression from novice (0) to expert (7). The numbers were intended to measure perceived growth rather than any statistical significance.

Students were assessed on distance education core competencies at the beginning and end of the course. Respondents provided open-ended verification of the numerical ratings along the side of each core competency "step" at both viewings of the assessment instrument. An example of verification was included in the instructions.

The researchers used competency-based behavioral anchors at level 2, 4, and 6 and students' written verifications to authenticate ratings as seen in Figure 1 (Dooley & Lindner, 2002; Smith & Kendall, 1963). A person with a score of "7" demonstrates expertise in the core

competency area. A person with a score of "4" would be considered average and a person with a score of "1" would be a novice.

The constant comparative method was used for data analysis (Lincoln & Guba, 1985, pp. 339-344). This method includes four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. In summary, the researchers completed a content analysis of the graduate course materials and compared competencies with those found in the literature for the first stage (Thach & Murphy, 1995). Once categories were integrated, six core competencies were identified. An assessment instrument was created based upon the triangulated and integrated themes. Numerical averages were calculated and open-ended responses were coded and categorized. An audit trail was used to document the data sources.

Core Competency	Level	Competency-Based Behavioral Anchors
<i>Adult Learning Theory</i>	2	<ul style="list-style-type: none"> • Show someone how to do a literature review on student-centered learning
	4	<ul style="list-style-type: none"> • Present a short workshop on the theory of andragogy • Develop and deliver a student-centered training program that incorporates adult learner characteristics and student learning styles
	6	
<i>Technological Knowledge</i>	2	<ul style="list-style-type: none"> • Show someone how to log onto a computer and search the Internet
	4	<ul style="list-style-type: none"> • Show someone how to access and use Web course tools • Show someone how to design and execute a Web-delivered course using Web course tools
	6	
<i>Instructional Design</i>	2	<ul style="list-style-type: none"> • Use an ice-breaker or opening to gain attention • Prepare a lesson plan • Write measurable instructional objectives for curricula that provide for student-centered learning
	4	
	6	
<i>Communication Skills</i>	2	<ul style="list-style-type: none"> • Facilitate a videoconference • Create virtual teams for discussion threads • Design appropriate synchronous and asynchronous communication methods for delivering course materials at a distance
	4	
	6	
<i>Graphic Design</i>	2	<ul style="list-style-type: none"> • Rely on technical experts to develop multimedia • Show someone how to develop a PowerPoint presentation with graphics • Show someone how to use animation, video streaming, and text to effectively deliver content
	4	
	6	
<i>Administrative Issues</i>	2	<ul style="list-style-type: none"> • Rely on technical experts for scheduling and copyright clearance • Identify and use available support services to plan and organize a course • Determine fiscal, human, and technical needs to plan and implement a curriculum entirely at a distance
	4	
	6	

Figure 1. Distance Education Competency-Based Behavioral Anchors (Dooley & Lindner, 2002).

Results

The results of this study were reported in two areas: average core competency growth by students and growth by delivery strategy (synchronous and asynchronous), gender, department, and degree. Based upon the literature (Dooley & Lindner, 2002) and the researchers' past experiences and inductive judgments, growth of a one-step incremental was established as a discrepancy indicator between groups.

The course content for the core competency *adult learning* included philosophy of teaching, adult learner characteristics, and learning styles. *Technological knowledge* included WebCT, interactive videoconferencing, computer hardware/software, and communication tools. *Instructional design* included course planning and organization, gaining attention, writing instructional objectives, active learning strategies, and evaluation. *Communication skills* included presenting content, questioning and facilitation, feedback, and collaboration/teamwork.

Graphic design included formatting visuals for TV display, design considerations for Web pages, and multimedia components. *Administrative issues* included support services, copyright/intellectual property, technology access, and financial considerations.

At the beginning of the courses, students tended to have similar competency levels on all core competencies regardless of whether the course was delivered synchronously or asynchronously (see Table 1). At the end of the courses, students tended to have similar competency levels on all core competencies regardless of how the course was delivered. With the exception of the communication skills competency, students demonstrated an approximate average growth of two-steps. Students in the synchronously delivered course demonstrated a one-step average growth. Students in the asynchronously delivered course failed to demonstrate a one-step average growth, however these students had a higher level of communication skills at the beginning of the course.

Table 1

Average Growth by Students Enrolled in an Asynchronously and Synchronously Delivered Course (N=42)

	Competency Level		
	Before	After	Growth
Core Competency-Synchronously delivered (n=20)			
Adult Learning Theory	3.4	5.2	1.8
Technological Knowledge & Skills	3.0	5.0	2.0
Instructional Design	3.4	5.5	2.1
Communication Skills	3.8	5.2	1.4
Graphic Design	2.3	4.3	2.0
Administrative Issues	2.8	4.7	1.9
Core Competency-Asynchronously delivered (n=22)			
Adult Learning Theory	3.1	5.2	2.1
Technological Knowledge & Skills	3.6	4.9	2.3
Instructional Design	3.3	5.2	1.9
Communication Skills	4.5	5.3	0.8
Graphic Design	2.7	4.5	1.8
Administrative Issues	3.0	4.9	1.9
Overall total growth for both synchronous and asynchronous delivery (N=42)	3.2	5.0	1.8

Note. Numbers represent a position on a stair-step (rather than a continuum or Likert-type scale). The researchers, using the competency-based behavior anchors described in Figure 1, authenticated student placement on the stair-step: Novice (0) to Expert (7).

Due to limitations in page requirements in this paper, the researchers have provided only a snapshot of the qualitative verifications with examples from respondents on each of the core competency

areas for both the synchronous and asynchronous courses (See Table 2). These qualitative verifications were used to authenticate the numerical data representing growth in each of the core competencies.

Table 2

Qualitative Snapshot of Respondents' Verifications of Competency Growth in Synchronously and Asynchronously Delivered Course Formats

	Synchronously delivered	Asynchronously delivered
Adult Learning Theory	"As for Adult Learning Theory, I gained considerable knowledge in the different learning styles and characteristics of this audience." (MMAE13)	"Increased knowledge level especially in learning styles - had a much broader exploration in this area." (FMAG7)
Technological Knowledge	"I grew most in the area of technical competence. I had absolutely no idea what WebCT was and not much about distance education until this class." (FMAE15)	"I used FrontPage to develop a web page. I routinely used threaded discussions as a primary source of interaction with peers." (FMEH9)
Instructional Design	"I [grew] mostly in my theory of teaching and design of class techniques." (FMAE20)	"[I] know how to plan courses including gaining attention and engaging the learner. [I] can write instructional objectives and design evaluation." (MDAG5)
Communication Skills	"I knew nothing about the vast number of techniques used to make a good presentation and make distance sites feel included. Now I know all about eye contact with the camera and calling on students directly." (FMWF9)	"I am a strong verbal presenter. I am still learning how to get my point across without sounding too aggressive online through e-mail and threaded discussions." (MDAG2)
Graphic Design	"In the graphic design area my growth mainly occurred in the area of web-page design and formatting visuals for TV display. I had no idea all the work that goes into creating one [web-page]!" (MMAE13)	"I have created .wav files and added them to a PowerPoint presentation which automatically transitions from slide to slide. I have developed a web-page with assistance." (MDEH11)
Administrative Issues	"Most of my growth occurred in administrative issues such as copyright." (MMAE14)	"Increased knowledge greatly on support services and other administrative factors surrounding the development of a distance education program." (MDAG14)

Table 3 shows student growth in core competencies by gender, department, and degree sought. At the beginning and end of both courses, students tended to have similar

competency levels on all core competencies with respect to gender. This was also true in respect to department affiliation and degree sought.

Table 3
Average Student Growth by Gender, Department, and Degree (N=42)

	Competency Level					
	Before		After		Growth	
	Female (n=20)	Male (n=22)	Female (n=20)	Male (n=22)	Female (n=20)	Male (n=22)
Gender-Core Competencies						
Adult Learning Theory	3.0	3.6	5.0	5.2	2.0	1.6
Tech Knowledge & Skills	3.2	3.4	5.1	4.9	1.9	1.5
Instructional Design	3.2	3.4	5.2	5.2	2.0	1.8
Communication Skills	4.1	4.2	5.3	5.3	1.2	1.9
Graphic Design	2.7	2.3	4.8	4.5	2.1	2.2
Administrative Issues	3.0	2.7	4.6	4.9	1.6	2.2
Department-Core Competencies	AGED (n=30)	Other (n=12)	AGED (n=30)	Other (n=12)	AGED (n=30)	Other (n=12)
Adult Learning Theory	3.3	3.2	5.0	5.3	1.7	2.1
Tech Knowledge & Skills	3.1	3.8	4.9	5.2	1.8	1.4
Instructional Design	3.4	2.9	5.3	4.9	1.9	2.0
Communication Skills	4.1	4.3	5.3	5.2	1.2	0.9
Graphic Design	2.3	2.8	4.5	5.0	2.3	2.2
Administrative Issues	2.9	2.8	4.9	4.3	2.0	1.5
Degree-Core Competencies	Master's (n=28)	Doctoral (n=14)	Master's (n=28)	Doctoral (n=14)	Master's (n=28)	Doctoral (n=14)
Adult Learning Theory	3.3	3.1	5.1	5.1	2.0	2.0
Tech Knowledge & Skills	3.4	3.2	5.0	4.9	1.6	1.7
Instructional Design	3.4	3.1	5.3	5.1	1.9	2.0
Communication Skills	4.3	4.0	5.3	5.4	2.0	1.4
Graphic Design	2.6	2.2	4.6	4.6	2.0	2.4
Administrative Issues	2.9	2.8	4.7	4.8	1.8	2.0

Note. Numbers represent a position on a stair-step (rather than a continuum or Likert-type scale). The researchers, using the competency-based behavior anchors described in Figure 1, authenticated student placement on the stair-step: Novice (0) to Expert (7).

Conclusions, Implications, and Recommendations

The findings of this study contribute to the growing body of literature related to identifying and assessing student competencies. The competency-based, behaviorally anchored instrument provided a model to evaluate and authenticate student growth (learning). This model can be used to help students better understand their core competencies, which can be compared

against behavioral anchors, and may increase student satisfaction, motivation, learning, and ultimately success in a course (Drawbaugh, 1972). Use of anchors to authenticate results overcomes limitations of self-administered rating scales that are typically used to measure student perceptions of competencies. This model can serve as an additional tool to measure the quality of teaching and student mastery of required course objectives. It is recommended that instructors teaching at a

distance consider the use of competency-based, behaviorally anchored instruments to verify learning as a result of the course or training program.

Students increased approximately two steps in each of the core competency areas in both the synchronous and asynchronous course, except for the core competency of communication skills. The asynchronous learners demonstrated less growth, but also had higher competence upon entering the course. An implication exists that the use of assessment measures can provide instructors with information about the learners so they can modify instruction. For example, if the graduate students are already proficient in a core competency, more time can be spent on other areas. This is important for student-centered, self-directed learning, such as the case with distance education delivery. The researchers recommend the use of pre and post measures to authenticate knowledge, skills, and abilities (competencies) at the beginning and end of the course or program.

The findings presented in this paper do not confirm Napiekowski's (2001) assertion that students learn more in a synchronously delivered course. Findings show that regardless of instructional method (synchronous or asynchronous), students' learning was similar. The findings further suggest that student core competency growth was similar with respect to gender, department, and degree sought. This finding is consistent with Dooley and Lindner (2002) and Lindner and Dooley (2002). Further research is recommended in different university and corporate settings.

"There is evidence...that it is the method of instruction that leads more directly and powerfully to learning...It seems not to be media but variables such as instructional methods that foster learning" (Clark, 1983, p. 449). We found this to be the case in this particular study. For agricultural educators who are designing and delivering courses at a distance, this finding is beneficial. If learning is similar between ITV and Web-developed courses, the issue becomes one of faculty expertise and access to media resources and support personnel. In other words, it is an *efficiency* concern rather than *effectiveness*.

The "hidden" work of teaching distance courses requires a good deal of preparation and planning to be successful (Wolcott & Betts, 1999). "The difference in effort presumably involved more instructional design and development, which results in more effective instructional methods for the students" (Clark, 1983, p. 449). The researchers for this study have found that asynchronous courses require much more development time prior to delivery and were expected to be more efficient while students were taking the course. However, the role of facilitator and manager of student progress is extremely time consuming in asynchronous environments and more research is needed in how to make these environments more efficient.

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