Distance Learning in Postsecondary Career and Technical Education:

A Comparison of Achievement in Online vs. On-Campus CTE Courses

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DISTANCE LEARNING IN POSTSECONDARY CAREER AND TECHNICAL EDUCATION: A COMPARISON OF ACHIEVEMENT IN ONLINE VS. ON-CAMPUS CTE COURSES

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ABSTRACT

This study builds on a recent national survey that determined the current status and future trends associated with distance learning in postsecondary career and technical education (Johnson, et al., 2003). The primary goal of this study was to explore, in detail, the effectiveness of distance learning via the Internet as a strategy for providing skill-based education and training to students enrolled in postsecondary career and technical education (CTE). Emphasis in this study was placed on (a) examining the differences between online and campus-based delivery models in terms of student achievement (i.e., assessment of content knowledge gain and the quality of student assignments and projects) and (b) describing the course structure and environment created to help students gain CTE skills. The study also compared variables such as interaction within the course, course structure, and student support across the two different course delivery formats. To accomplish the research goals, a series of quasi-experimental studies were designed using equivalent online and campus-based CTE courses that varied only in their delivery format. The combination of the earlier national survey of distance learning in postsecondary CTE programs and these experimental comparison studies help to establish a baseline for distance and online technology use and practice in postsecondary career and technical education. These studies enable researchers, practitioners, and policy makers to make informed decisions about future trends and uses of distance learning in postsecondary CTE.

PURPOSE OF THE STUDY

The purpose of this study was to investigate the course structures and environments used for online CTE courses, and to compare their effectiveness to equivalent campus-based courses in terms of the extent to which the students demonstrated the desired learning outcomes. The following research questions guided the design of this study:

1. How do student achievement and skill development in online courses compare to those in on-campus courses?

2. How do student motivation and learning strategies differ for on-campus and online students?

3. How do online and on-campus courses differ in terms of course interaction, content organization, student support, and transactional distance (i.e., feelings of closeness to the instructor and program)?

BACKGROUND

Overview of Distance Learning

Distance education is "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements" (Moore & Kearsley, 1996, p. 2). Although correspondence courses using print-based media and audio- and video-tapes mark the origins of distance education, the introduction of new technologies throughout the years have resulted in other forms of distance delivery including radio, television, interactive video, and the computer. Today's distance education increasingly relies on the Internet for delivery. A variety of labels are used to describe this new form of distance education; the most common of which are online learning, Web-based instruction, and eLearning. Whatever terms are used for educational programs delivered over the Internet, they all share common characteristics. Students who participate in online programs are able to learn at their own pace through courses delivered largely or entirely online that are accessible 24 hours a day from anywhere in the world. In other words, learning can occur at any time, any place, and at any pace. Wonacott (2001) concluded that "despite the many challenges of distance delivery, the factor of increased access overrides other issues" (¶ 14), as shown by increases in both offerings and enrollments."

This type of technological change is not new to the distance education community, which has seen technology-based educational innovations come and go with much fanfare but little substantive change to methodologies or outcomes (Heinich, Molenda, Russell, & Smaldino, 1996). The development of instructional films in the 1960s was supposed to radically change the educational delivery system, as were instructional radio and television. While each of these technology innovations had some impact on educational programs, they did little to change the fundamental nature of education (Reiser, 2001). The Internet and computer technology, as the next generation of technological innovations to impact distance education, appear to have the power to significantly alter the education landscape if used appropriately (Harasim, 1989; Owston, 1997).

The popularity of distance education programs in recent years is due to the growth of the Internet and improvement of technologies that support online learning environments, a growing recognition of the need for lifelong learning and reeducation of the populace, and budget restrictions of education providers. These factors have created a significant incentive for colleges and universities to develop online programs (Volery & Lord, 2000). Current statistics highlight the unprecedented escalation in the number of instructional programs offered through distance learning. For example, both the number of courses taught at a distance by postsecondary institutions and their enrollments nearly doubled between 1994–'95 and 1997–'98. In just 1 year, between 1997 and 1998, the growth of distance education programs in higher education was well over 70% (Lewis, Snow, Farris, Levin, & Greene, 1999). Future projections suggest that this incredible pace will continue because of the increasing popularity of and access to online or Web-based instruction. In 1998, approximately 700,000 postsecondary students were enrolled in online courses; this number is projected to increase to over 2 million by 2003 (Meister, 2000).

Students enrolled in distance education as a percentage of total postsecondary enrollments are projected to triple from just 5% in 1998 to almost 15% in 2002 (Cappelli, 2000).

Distance Learning in CTE

Community colleges are actively involved in distance learning programs in CTE. Based on data from a recent national survey, 76.3% of community colleges offer some form of distance learning in CTE (Johnson et al., 2003). An average of 958.7 enrollment credits in distance CTE are offered each year through an average of 36.5 distance CTE courses per institution. Nationally, community colleges offer an average of 2.1 degree programs, 2.3 credit certificate programs, 1.6 noncredit certificate programs, and 0.8 noncredit licensure/credential programs in CTE at a distance. These community colleges offer CTE at a distance because it helps them reach nontraditional students (83.0% of responses), reduces time constraints for students (82%), increases access to new audiences (79.1%), increases student access to academic courses (77.7%), and increases student access by making courses available at convenient locations (74.8%). The majority of the community colleges participating in the survey (88.6%) reported that they expected moderate-to-large increases in their distance CTE enrollments, and these percentages were consistent across institution locations, regions, and sizes. Much of the expected growth in distance learning is due to the fact that "lifelong learners want greater flexibility to accommodate diverse personal circumstances" (Wonacott, 2001, ¶ 2), which include meeting family and job responsibilities (Zirkle, 2003).

Over the years, isolated studies of CTE courses (e.g., biology, accounting, nursing) comparing the effectiveness of distance courses to traditional face-to-face courses have typically resulted in findings of "no significant difference" (Russell, 2002). According to the limited number of studies that have focused directly on student outcomes (e.g., grades and test scores), "students in distance learning courses perform as well as their counterparts in traditional classroom settings, earn similar grades or test scores, and display the same attitudes toward the course" (Web-based Education Commission, 2000, p. 95). A recent meta-analysis of 232 comparative studies of distance and face-to-face courses found effect sizes of 0 (zero) on independent measures of student achievement, attitude, and retention outcomes—suggesting that "many applications of distance education outperform their classroom counterparts and many applications perform poorly" (Barnard, et al., in press, p. 2). Meyer (2002) suggested that ample interaction and constructivist methods were the key to success in distance learning. These findings are consistent with earlier claims that learning outcomes are impacted more by the content and design of the instruction than by the instructional delivery mode (Clark, 1983; 1994).

There does appear to be an advantage to distance learning courses if one looks beyond learning outcomes. For example, a recent study of baccalaureate nursing students found a significant difference between online and face-to-face students in their degree of "enculturation" or socialization into the field of nursing (Nesler & Hanner, 2001). In that study, the distance students had higher socialization scores than did the campus-based nursing students. This suggests that distance learning courses can contribute to the social or "soft" skills of CTE students.

In general, however, few studies have systematically investigated the effectiveness of postsecondary CTE courses delivered online when compared to those delivered face-to-face (Zirkle, 2003). The overall lack of attention in the literature to distance learning in CTE raises several key concerns that must be addressed. First, there are concerns about the isolation of the online student and how that impacts the learning process. Second, because of its growing prevalence, the CTE community needs to know how distance learning impacts student achievement at the postsecondary level. The issue of student achievement is more complex for CTE than for other fields of study because of (1) the importance of developing vocational and technical skills, (2) the need for articulation between secondary and postsecondary programs, and (3) the requirement that CTE students be able to apply their learning in workplace settings. This study was designed to address these concerns.

Isolation and Interaction at a Distance

Aother unique aspect of this study is the examination of the interactions that occur among students and between students and their instructor. Interaction in this study is aligned with the theory of transactional distance, which describes the construct of perceived interpersonal closeness (Bischoff, Bisconer, Kooker, & Woods, 1996). According to Jung (2001), transactional distance is at a maximum when there is no interaction and when the learning materials are pre-planned and include no flexibility. Transactional distance addresses four essential types of interaction: (a) learner–instructor, (b) learner–learner, (c) learner–content, and (d) learner–interface (Chen, 2001; Moore, 1989).

Transactional distance, which addresses feelings of closeness between and the instructor and students in a learning environment, is a function of both “dialogue” and “structure” (Moore, 1993). Dialogue in a class is influenced by the course content, the educational philosophy of the instructor, the design of the course, the psychological characteristics of the instructor and the learner, and the characteristics of the communication medium. Course structure relates to the degree of individualization of learning experiences in terms of the course objectives, teaching strategies, and student evaluations. The teaching philosophy, design of the course, and the psychological characteristics of the instructor influence course structure. A learning environment with low structure and high dialogue will yield “close” transactional distance, whereas high structure and low dialogue will result in “remote” transactional distance. Other variables of interest include the students’ perceptions of the course organization and the degree of support they receive as students in a course. Examining issues of course interaction, structure, and support will provide additional insight into the nature of online learning for CTE students.

Overview of Skill Development through Distance Learning

According to the Merriam-Webster (1997) dictionary, *skill* is defined as the ability to use one’s knowledge effectively and readily in execution or performance. It can also be viewed as a degree of dexterity or coordination, especially in the execution of learned physical tasks. This dichotomous definition echoes the theoretical basis for skill training that includes both cognitive and psychomotor branches.

The foundations of the behaviorist tradition may have begun with work like that of Thorndike around 1874. His Law of Effect holds that learning is an automatic process without intervention of conscious awareness (Driscoll, 1994). Learning proceeds as an unconscious strength training of a habit and connections between environmental stimulus and student response. Recurrence of the desired behavior is controlled by its consequence, and the stimulus–response associations are strengthened through repetition. B. F. Skinner extended this concept further by emphasizing the role of repetition and positive and negative reinforcement in the development of skills. His operant conditioning approach explains how skills are developed through a system that provides repetition and reinforcement of step-by-step procedures (Driscoll).

Two important factors in skills development are practice and feedback. Fitts and Posner (1967) offered a three-stage model of learning: (a) cognitive or novice stage—proceeds rapidly and consists of the discovery of what is to be done, (b) associative—this stage focuses on discovery of the most effective way of performing the task, and (c) autonomous—long-term transition to automaticity. Deliberate practice occurs (Ericsson, 1996) when there is a well-defined and appropriate task for the learner and when the learner receives informative feedback while given multiple opportunities to repeat the task to correct errors in performance. While competence may be achieved in as little as 100 hours of practice, Ericsson, Krampe, and Tesch-Romer (1993) hold that expertise requires intense practice for a minimum of 10 years. Expert knowledge is more extensive and contains more decision rules; enhanced memory structure promotes faster and more adaptable problem solving and normally applies to a specific domain.

Feedback is also critical in the development of skills and comes in many different forms. Intrinsic feedback relates to the feedback that is received directly from the senses, while augmented feedback is external and supplemental to intrinsic feedback. Concurrent feedback occurs at the time the skill is being practiced, while terminal feedback occurs after the completion of the skill. Knowledge of results provides information about the quality of the performance and includes suggestions for ways to improve in future attempts.

The focus on student achievement and skill development through distance learning is a unique aspect of this study. Skill training has been perceived as a major limitation of distance education in the past. Although skill development is often an individual event, as mentioned above, it does require real-time reinforcement and feedback. Herein lies the perceived problem with developing skills through distance learning. Fortunately, distance learning programs in CTE have developed a variety of strategies or models for helping students acquire skills at a distance (Johnson et al., 2003).

There are at least five basic models being used for skill-oriented courses in distance CTE programs. The first model, on-campus skill acquisition, is a blended approach that requires students who are enrolled in distance education courses to come to campus to learn their skills in the school laboratories and shops. The second model consists of licensed apprenticeships that are formally approved by some governing agency. Students register for the apprenticeships and then learn and practice their skills on-the-job. The third model, clinical mentoring, provides skill development in a clinical setting through a mentoring relationship with the employer. In this

model, the employer serves as the trainer and evaluator. In the fourth model, the student becomes an independent contractor and seeks opportunities to practice the skills being taught in the course. The final model of skill development uses computer simulations to teach skills to students and allows them to practice using the skills. The simulations can also serve as unbiased evaluators of skill attainment.

Skill development models are not new. Each of these models relies upon experiential learning, many of which are applicable to workplace settings. These models have their roots in cooperative education, which has been shown to have two overarching goals: (a) integration of workplace learning with classroom learning, and (b) development of tools that allow the student to find "self-realization" in workplace settings (Saltmarsh, 1992). Use of experiential learning has not only been shown to be successful for skill development due to it's multi-sensory nature (Saltmarsh), it also fits well with those andragogical principles that have been shown to be effective for adult learners—particularly the linking of theory to practice (Cantor, 1992). Sharon (1976) describes a comprehensive work assessment model that selects competencies found in the workplace, builds objectives for those competencies, and develops multiple methods of assessment. The success of these programs can be found in the satisfaction of those who employ their graduates. For example, internships have been cited by employers as one of the best ways to prepare for work and gain practical experience (Oblinger & Verville, 1998). While many aspects of these early skill development models have been retained in distance-education CTE programs, technology has been incorporated as well to enhance flexibility and access for students.

METHOD

Research Design

A mixed-method design was utilized for this research. This design included quasi-experimental studies that compared student achievement in equivalent online and face-to-face courses and qualitative case studies that fully described each of the matched sets of courses. Because the small number of students in the various course samples limits the generalizability of the statistical findings, the statistical analysis was supplemented with detailed qualitative case descriptions of each course. This qualitative analysis allows readers to apply the concept of transferability to determine the applicability of the study findings to specific situations (Merriam, 1998).

Despite their popularity, the studies that compare online courses to face-to-face courses raise concerns about quality. Barnard et al. (in press) argue that comparison studies have ceased to provide useful contributions to the distance education literature and suggest that researchers move forward with research that examines and compares instructional strategies used in distance environments. An Institute for Higher Education Policy analysis of the distance education research literature indicates that distance education research has not kept pace with distance education use (Phipps & Merisotis, 1999). The report identified four key shortcomings of research on the effectiveness of distance learning: (a) extraneous variables are often not controlled, (b) subjects are rarely randomly selected or assigned, (c) the validity and reliability of instruments are questionable, and (d) the effect of student and instructor attitudes regarding distance learning is not addressed. This study was designed to minimize these shortcomings.

Sample and Course Selection

The population of the study consisted of students who were enrolled in postsecondary CTE courses in 2002 and/or 2003. The data from the national survey of distance learning in postsecondary CTE were utilized to identify and select five pairs of matched courses for this research (Johnson et al., 2003). The chosen pairs of courses reflect the wide range of CTE courses offered at the postsecondary level (e.g., Animal Laboratory Procedures, Animal Nursing and Medicine Laboratory, Embalming, Restorative Arts, Landscape Design). See Appendix A for detailed course descriptions.

To yield legitimate findings and to minimize the number of factors that could influence the validity of the study, the following criteria were used for selection of the matched pairs of online and campus-based courses.

- The courses were recognized as exemplary by the colleges that offered them.
- The learning context of the courses addressed specific skill training, as well as knowledge and attitudes for job employment or advancement.
- Each pair of courses was developed by the same instructor and was delivered by the same department.

- Both versions of the course were taught by the same instructor or by the instructors who worked together on the course and who used similar teaching approaches.
- The learning objectives and requirements of the online and campus-based versions of the course were similar, and each version covered the same context and outcomes, and required the same projects.
- The courses were offered during the same time frame and there were no special conditions or rules established for accepting or assigning students to the online and campus-based versions of the course.
- For online courses, the primary interactions between instructor and students, students and students, and students and content were mediated by an online technology.

Based on the above sampling procedure, five courses at three community colleges with a total of 112 campus students and 81 online students were identified as participants for this study (Table 1).

Table 1
Listing of Participant Courses with Number of Students

		Course type	
Institution	Course name	On-campus	Online
Jefferson State Community College (Birmingham, AL)	Embalming II (FSE 202)	17	9
	Advanced Restorative Arts (FSE 214)	9	5
St. Petersburg College (St. Petersburg, FL)	Laboratory Procedure Lab I (ATE 2658L)	39	23
	Animal Nursing & Medicine Lab I (ATE 2651L)	34	34
County College of Morris (Randolph, NJ)	Landscape Design and Planning I (AGR 211)	13	10
	Total	112	81

Instrumentation

To provide inclusive description and assessment of the examined courses and student achievement, several instruments were used for data collection. The primary data collection instruments included the Motivated Strategies for Learning Questionnaire (MSLQ), the Course Interaction, Structure, and Support questionnaire (CISS), specially designed pretests and posttests, and course projects and final examinations. To better understand the students' demographic profile and to describe their aptitude characteristics, additional items were included in the questionnaires. Among these were questions regarding students' gender and ethnic background, number of hours worked in the field, other work experiences, number of enrolled credit hours during the semester, and the students' ratings of the course quality and the instructor. See Appendix B for samples of the instruments.

The following instruments were administered in both paper-based and online formats. For the online version of the instruments, a Web site with online versions of the instruments was designed, developed, and tested. HTML and Java-based technologies were used to develop and administer the online versions.

Motivated Strategies for Learning Questionnaire

The Motivated Strategies for Learning Questionnaire (MSLQ) was used to assess the students' motivation and learning strategies used during the courses (Pintrich, Smith, Garcia, & McKeachie, 1991). The MSLQ is a self-report instrument designed to assess college students' motivation toward learning and their use of different learning strategies in a course. MSLQ uses a 7-point Likert scale (ranging from 1 = *not true of me* to 7 = *very true of me*). The motivation section of the MSLQ consists of six sub-scales with items designed to assess students' goals and value beliefs for a course, their beliefs about their skill to succeed in a course, and their anxiety about tests in a course. Specific sections of the instrument include intrinsic (α = .74) and extrinsic (α = .62) goals orientation, task value (α = .90), control of learning beliefs (α = .68), self-efficacy for learning and performance (α = .93), and test anxiety (α = .80).

The learning strategy section consists of nine sub-scales with items regarding students' use of different cognitive and metacognitive strategies, as well as management of various resources. Students rate themselves on the same 7-point Likert scale used in the motivation section. Two sections of the original instruments were used in this study. Twenty-seven items were used within the categories of resource management strategies, or time and study environment (α = .76) and effort regulation (α = .69). Five of these questions were constructed as negative statements and, for the purpose of this study, were calculated as reversed scores. Compared to the original instrument, the questionnaires used for this study have a few minor wording differences.

Course Interaction, Structure, and Support

Another instrument utilized in the study was the Course Interaction, Structure, and Support questionnaire (CISS). CISS was used to determine student perceptions regarding the organization of the content, the degree of student support provided, and the amount of student/faculty interactions within the course (Shaik, 2002). CISS was originally adapted from two instruments

(i.e., Distance and Open Learning Scale, and Dimensions of Distance Education), which are grounded in educational theory and have undergone thorough statistical testing (Harrison, et al., 1991; Jegede, Fraser, & Curtin, 1995). CISS is an appropriate tool to use in this study because it was validated based on data collected from hundreds of college students who were participating in online or face-to-face courses. Exploratory and confirmatory factor analysis procedures were used to establish the construct validity, the reliability, and the factor structure of CISS.

Pretests and Posttests

The instructors of the courses included in the study were asked to prepare pretests to assess students' knowledge of the content being delivered in the courses. The instrument was administered to students on the 1st day of class and on the last day of class. Pretests were conducted in all five courses included in the study, while posttests were conducted in two of the five. Three instructors chose to substitute the final exam for the posttest, even though it was different from the pretest.

Course Projects

Because part of the focus of this study was on skill development in online courses, four of the five courses included in the study required students to complete one or more projects demonstrating their mastery of the skills developed in the course.

Procedures

Quasi-Experimental Studies

A nonequivalent control group design was used to test the research hypotheses and to investigate causal relationships between the students' achievement and the delivery format of the courses. Due to constraints at the participating institutions, it was impossible to randomly assign students to either a campus-based or online course format. Because of the need to work with pre-existing groups of students in the matched sets of courses, any preexisting differences between the matched groups of students were examined (i.e., students' demographic and aptitude characteristics, work experience in the content area, and semester course load).

Qualitative Case Descriptions

Developing vocational and technical skills is a defining aspect of CTE programs, yet the effectiveness of the online learning format for mastering such skills has not been confirmed. Thus, the qualitative part of this study attempted to provide in-depth descriptions and some understanding of how institutions plan and deliver online CTE courses for skill-building. These descriptions supplement the quantitative findings of the study and provide readers a context for interpretation and application of those findings.

Semi-structured interviews with the faculty, observations of the course activities, and review of course documentation were utilized for data collection and analysis. Such an approach provided for triangulation of the data through examination of each pair of matched courses and their instructional context. It also helped to understand the extent to which the online format influences students' motivation, learning strategies, and overall achievement. Insights were also gained regarding effective instructional strategies and technologies used in online CTE courses.

Data Collection

The data collection process consisted of several steps. Data were initially collected from the students in each matched pair of courses using the motivation section of the MSLQ and a pretest at the beginning of the semester. A posttest, the learning strategies section of the MSLQ, and the CISS were administered at the end of the course.

The actual format of the data collection varied slightly at each research site. At St. Petersburg College and County College of Morris, the instruments were administered online for the students in both the online and the campus-based courses. An e-mail message was sent to every student asking him/her to complete the questionnaire within a set time frame by accessing a Web site through a Web browser. These students completed the instruments online and submitted their results electronically. At Jefferson State Community College, data collection occurred on-site for both groups of students, using paper versions of the instruments.

Data collection also involved the examination of course documentation. This included the collection of student assignments, results of course exams, and final course grades, as well as copies of the students' projects. Descriptive and procedural course data also were collected from a variety of sources, including the official course description, course syllabus and other course-related documents, demographic enrollment data, and documented interviews with the instructors. These phases of the data collection were conducted when the documentation became available. The data collection also consisted of on-campus interviews and observations of instructors and students, and a review of the online course. Interview data with the course instructors were collected prior to the start of each course and after the course was completed via telephone and e-mail conversations. Guided interview protocols were used to direct the interviews.

Data Analysis

Quantitative data analysis. The analysis of the collected data was conducted as follows. First, descriptive statistics of the students' demographic and aptitude characteristics, as well as pretest and posttest scores, teacher evaluations of course projects, results of final exams, and motivation, learning strategy, and learning environment assessment data were calculated. The differences among these outcomes were then examined according to the delivery format. Because the samples were small and the normalcy of the groups was unknown, the nonparametric Mann-Whitney U test was used for comparison of student achievement across the two instructional delivery formats (Glass & Hopkins, 1996).

Microsoft® Excel and SPSS 11.0 software programs were utilized for data analysis. For each research site, data collected from the questionnaires and course documents were manually or electronically entered into an Excel spreadsheet for initial analysis and coding. The analysis included calculations of pretest and posttest scores and midterm and final exam scores. The coding procedure included dummy coding of non-numerical data and converting the scaled items into numeric values. The data were verified, coded, and recalculated. Recalculation included converting the negatively-worded Likert scale questions into the reversed (positive) scores. The data from the master Excel spreadsheet were converted into an SPSS data file for further statistical analysis.

Statistical analysis was comprised of descriptive statistics and comparative analysis between matched pairs of the courses. The Mann-Whitney U test was utilized for comparison of pretest and posttest results with a level of significance equal to .05 on all statistical analyses.

Qualitative data analysis. As prescribed by Merriam (1998), the analysis of the qualitative data began concurrently with data collection, and employed the method of constant comparison. After each site visit, two researchers analyzed the site interview data and observation notes, clarified any discrepancies in understanding, and identified open questions needing resolution. Next, researchers analyzed the collected site documentation and compared it with the interview and observation data. When necessary, follow-up questions were posed to the key informants at each site. The findings were then summarized in a course matrix for each course. The matrices, in Microsoft® Word format, were shared via e-mail with the key informers for review and comment. The course matrix served as the input for the narrative case descriptions of each site. Information extracted from institutional literature (e.g., college handbook, flyers, handouts) was also incorporated into the narrative case descriptions. Each completed case narrative was routed to the key informants at each site for review and comment. The approved site case narratives were then combined with the statistical findings from each of the sites to provide a complete case description.

After the case descriptions were created for each site, the researchers performed a cross-case analysis to identify program and instructional strategies employed to facilitate the effective learning of hands-on CTE skills in online environments. The researchers also made qualitative comparisons of student characteristics and achievements across the sites to identify possible factors leading to successful learning of hands-on CTE skills in online environments.

DESCRIPTION OF RESEARCH SITES

Three different community colleges were involved in this study: Jefferson State Community College (Birmingham, AL), St. Petersburg College (Tampa, FL), and County College of Morris (Randolph, NJ). These colleges were selected for participation in this study because they have relatively long histories in distance education and their online programs have been identified as exemplary by their institutions.

Funeral Service Education at Jefferson State Community College

Two courses from the Funeral Service Education program at Jefferson State Community College (JSCC) were included in the study (i.e., Embalming II and Restorative Arts II). This section presents a detailed description of the school, the program, and the two courses.

Overview of Jefferson State Community College

Brief History of Jefferson State. Jefferson State Community College (JSCC) is located in Birmingham, AL. It is one of 12 junior colleges authorized by the State of Alabama Legislature in May 1963. JSCC was first fully accredited by the Southern Association of Colleges and Schools in December 1968. The Commission on Colleges of the Southern Association of Colleges and Schools is now the accrediting agency. Various programs offered by the college are also accredited by outside agencies such as commissions and professional associations.

The Alabama State Board of Education, by resolution, changed the name of the college from *junior* to *community* in 1989, to reflect the college's commitment to offering an integration of educational and workforce development programs. JSCC provides parallel degree, career and professional degree, certificate and non-credit certificate, dual enrollment, and distance learning programs to students. Admission requirements vary from program to program, depending on a student's status. Common to all programs, other than dual enrollment, is the requirement that students have either a high school diploma or a secondary school completion certificate.

Enrollment. In 2002, over 350 full- and part-time faculty members were on staff. Over 7,000 students were enrolled in for-credit courses and degree programs, and 1,000 were in training for business and industry and continuing education courses. JSCC serves a diverse group of students with the majority being White (75.5%), female (60.4%), part-time (62.1%) students between the ages of 17 and 29 (73.2%) attending courses during the day (46.2%) to complete course work for certificate and associate degrees (50.7%). The college also serves Black (18.3%), American Indian (0.3%), Asian (1.1%), Hispanic (0.9%), and International (3.5%) students, as well as those who are under the age of 17 (2.0%) and 30 and older (24.7%).

History of Distance Education at Jefferson State. JSCC made the commitment to offer distance education courses in the mid-1970s. Four telecourses in the humanities were first offered in 1978. The college began offering online distance courses in 1997, with three online distance courses and 30 student enrollments. As of the fall 2001 semester, 38 courses were being offered online with approximately 600 total enrollment. The online courses are designed so students can access them using a personal computer, a 28K dial-up modem or faster Internet connection, and the Microsoft® Internet Explorer 4.01+ or Netscape® 4.x Web browser. Some

courses require students to have access to the Microsoft® Office 97 software, or later versions of the same.

Funeral Service Education Program

The Funeral Service Education (FSE) program was established in 1968 in response to the Alabama Funeral Directors Association request for a program to serve the funeral service students in the state. At that time, the closest programs were at colleges in Nashville (TN), Dallas (TX), and Miami (FL). The program has been accredited by the American Board of Funeral Service Education since 1976.

The focus of the program is funeral service as a profession. To that end, the program provides a knowledge base upon which students can build a successful funeral service practice. It also strives to instill a keen sense of ethics among students and provide an awareness of their responsibility to their profession and their clients. There are currently two full-time and four part-time faculty members on staff meeting the needs of 36 full-time students. A lay advisory committee, composed of 17 professionals from the funeral industry, provides oversight for the program.

The program offers an Associate in Applied Science Degree and a Funeral Service Certificate. The curricula for both the degree and certificate programs are based on the American Board of Funeral Service Education "Curriculum Outline" that provides standards for subject areas such as microbiology, pathology, embalming, funeral directing, computer application to funeral service, and business law. The degree program also requires students to meet technical performance standards and criteria that are consistent with industry standards.

Associate in Applied Science Degree. The FSE program first offered the Associate in Applied Science Degree in 1968, with the first students graduating in 1969. Approximately 1,300 students have graduated from the degree program since 1968, and 36 are currently enrolled. The degree program is designed for students who have a state-board-sanctioned apprenticeship and are actively seeking to satisfy their state licensing requirements. The curriculum provides students with a broad understanding of funeral home operation, funeral directing, public health, and embalming, along with a foundation in communication skills. After completing the course work, students are qualified to sit for the national board and state board examinations. Graduates with this degree and a license are qualified to become funeral home directors and embalmers.

For admission to the program, a student must have completed 15 semester hours of general college-level course work in English, math, psychology or sociology, and an approved humanities elective, as well as have a registered apprenticeship with their state board of funeral service. Each student is responsible for locating and securing an apprenticeship with a licensed funeral home. The funeral industry is similar to other craft guilds: for a student to gain entry, they need to know someone in the industry who can assist them in acquiring and securing the apprenticeship. In the state of Alabama, funeral apprentices are required to work no fewer than 30 hours per week. The total hours worked per week varies from state to state. Though the program advises students to seek paid apprenticeships so they will be eligible for workers' compensation in case of injury on the job, apprenticeships are not regulated by the state in terms of monetary compensation for services rendered to funeral homes. Out-of-state students must

also register as apprentice embalmers with the Alabama Board of Funeral Service to complete the embalming laboratory course for the degree.

After being admitted to the program, students complete 52 semester hours of additional course work. The program gives students three timeline options for the completion of course work: 3 semesters, attending courses on campus 3 days per week; 4 semesters, attending courses on campus 2 days per week; or 4 semesters, completing all course work online. Students sign a contract with the program that commits them to completing the course work according to their chosen timeline. For a course to be counted toward graduation, a grade of C or better must be achieved.

Students must complete all course work within 4 semesters of initial enrollment in the program. The director may grant an extension of 3 semesters to students who have a 2.0 cumulative GPA. Those who do not complete requirements in the specified time period must repeat all course work for the degree, other than the general education courses. Students who choose and then do not complete the distance learning option within 4 semesters may not enroll in online courses after that time, and must complete all subsequent course work in the campus classroom.

After graduating from the degree program, students take the national board exam at an off-campus location. Students may retake the exam as many times as necessary, whether they fail both parts (arts and sciences) or just one part (arts or sciences). For 2002, the national first-time pass rate on the national board exam was 85%, while the rate for JSCC students (campus and online) was 100%. In 2003, the national first-time pass rate was 84%, while the JSCC rate was 92%.

Funeral Service Certificate. The FSE certificate was first offered to students in 1999. One student has graduated from this program, and no students are currently enrolled. The certificate program is designed for students who are interested only in funeral directing and not in becoming licensed embalmers. Students who approach the program about acquiring this certificate are encouraged to complete the associate degree because the certificate is not accredited by the American Board of Funeral Service Education, thus making students holding the certificate ineligible to take the national board or any of the state board exams that require graduation from a board accredited program.

Funeral Service Education at a Distance

The FSE program first began offering distance education courses in 1998 when three courses were made available online using the Nicenet Internet Classroom Assistant software. This was a text-based delivery system with no audio or video capabilities. Instruction was supplemented with video-taped and handout materials as well as textbooks. The program now makes both the AAS and certificate programs available to students online and on-campus. The online and campus programs run concurrently, meaning that each course that is offered on-campus during a semester is also offered online. Two full-time faculty members, one of whom is the program coordinator, design and build the online courses using the WebCT® learning management software. Four part-time faculty members, who review the design and offer suggestions for changes as needed, then teach the courses.

During summer 2003, the program began using the Tegrity WebLearner platform to capture and record in-class lecture sessions. The WebLearner software runs on off-the-shelf computer and audio/visual components that are placed on a mobile cart. The software captures the audio and video information from the class, including the instructor's spoken lecture, notes written on the whiteboard, and PowerPoint® slides. The program staff uploads the captured lecture presentations to a streaming server at the college and makes them available to students through WebCT®.

Students sign contracts specifying enrollment in either the online program or the campus program. While students are discouraged from switching between the two programs, online students have the option of attending campus sessions, and campus students have the option of accessing the WebCT® courses. In addition, students choosing the online option must attend on-campus class sessions three times each semester of enrollment: (1) at the beginning of each semester to attend course orientation sessions, (2) at mid-semester to take the midterm exam, and (3) at the end of the semester to take the final exam. On-campus exam review sessions are held the day before the midterm and the day before the final, but online students are not required to attend these sessions.

Two students graduated from the online degree program in 1998. Since that time, five student cohorts (20 students) have completed the online program. As shown in Table 2, the current cohort formed in fall 2002 with 14 on-campus students and 7 online students. When those students entered their 3rd semester of study in summer 2003 and enrolled in Embalming II and Restorative Arts II, their numbers had dropped to eight in the on-campus course and five in the online course. At the end of their 4th and final semester in December 2003, six students from the on-campus program and two from the online program graduated, and all passed the national board exam. Note that the total enrollments for Embalming II (20) and Restorative Arts II (9) for summer 2003 also included students from the following cohorts: spring 2003, spring 2002, spring 2001, fall 2001, spring 2000, and fall 2000. The spring 2003 cohort is scheduled to graduate in May 2004. The graduation dates for the other cohorts have already passed. These students are still enrolled in courses because they failed the courses (or their prerequisites) when they took them with their cohorts.

Table 2
Number of Funeral Service Education Students Retained Through Graduation and Board Exam

	Initial cohort enrollment (fall 2002)	Embalming II enrollment (summer 2003)	Restorative Arts II enrollment (summer 2003)	Graduated (12/03)	Passed board exam (1/04)
On-campus	14	8	8	6	6
Online	7	5	5	2	2

Embalming II. The Funeral Service Education program teaches embalming in a sequence of three courses: Embalming I, Embalming II, and Embalming Lab. In Embalming I, students learn the basic skills, aptitudes, and personal qualifications needed to become a professional embalmer, as well as each of the primary phases of embalming. In Embalming II, students learn about specific embalming problems and procedures, and upon completion are able to apply acquired knowledge and skills to an embalming case analysis. The Embalming Lab course is conducted at a funeral home local to JSCC. In this course, the students demonstrate their proficiency with embalming techniques by performing 20 embalmings that are observed and evaluated by a licensed embalmer using an evaluation rubric provided by JSCC.

The classroom version of the embalming sequence was first offered to students in 1969, and the online version in 1999. The online and classroom versions have evolved, with modifications being made to address and incorporate new funeral industry trends and procedures. The online course is identical in content and structure to the campus course, which was developed by an instructor no longer employed by the college. The detailed course description of Embalming II (see Appendix A) includes features common to both online and on-campus course versions. Students in both versions complete the same weekly reading assignments using the same textbook, supplemental reading materials, and study guides. A part-time faculty member teaches both versions. Both versions of this course are offered once a year during the same semester.

While the course description shows the features that the online and on-campus versions of Embalming II have in common, Table 3 highlights the differences in the two formats. Students completing the classroom version attend weekly lecture sessions presented in an on-campus classroom. They also attend midterm and final-exam review sessions. Students who are completing the online version log in to the course in WebCT® to watch and listen to the streamed recordings of the weekly lectures. They can choose to travel to campus to attend midterm and final review sessions that are presented in a classroom, but it is not mandatory that they do so. To assess learning outcomes, students completing the classroom version complete weekly quizzes as well as midterm and final exams. Students completing the online version do not complete the weekly quizzes. They do, though, travel to the campus to complete the midterm and final exams.

Students completing the classroom version interact with the instructor, other students, program staff, and support personnel every week the course meets during the semester, and can also meet one-on-one with them on campus during scheduled office hours. Students completing the online version only interact on-campus with the instructor, other students, the program staff, and support personnel at the beginning of the semester orientation, midterm examination, and final examination. These students must drive to campus for one-on-one meetings during scheduled office hours or by appointment. All students have access to the instructor, the program coordinator, and the tutor/technical support person 24/7 via e-mail, and also by telephone during the normal weekday work hours. The online course content does not make use of any synchronous or asynchronous tools to promote collaboration or discussion among the students or among the students and instructor.

Table 3
Characteristics of On-Campus and Online Formats of Embalming II Course (FSE 202)

Course characteristics	On-campus	Online
First offered	1969	Spring 1999
Enrollment (spring 2003)	20	9
Meeting frequency	Weekly on-campus face-to-face class sessions	On-campus faculty/student sessions for orientation, midterm and final reviews, and exams
Instructor office hours	2 hours/week; 24/7 via e-mail and telephone	24/7 via e-mail and telephone
Lectures	Delivered each week to on-campus students in face-to-face classroom	Audio-streamed recordings of the classroom lectures that are made available to students weekly via WebCT®
Class activities	• Lecture–discussion sessions • Audiovisual presentations • Simulations	• Recorded classroom lecture–discussion sessions • Audiovisual presentations • Simulations
Class discussions	• Weekly in-class sessions • Midterm review session • Final review session	• On-campus midterm review session • On-campus final review session
Tests/quizzes/exams	• Weekly quizzes • Midterm • Final	• Midterm • Final
Technologies used	• WebCT® Learning Management Software • Tegrity® software • PowerPoint® software • RealPlayer® software • Whiteboard • E-mail • Telephone	Same as on-campus, since on-campus students all have access to online course
Minimum technology standards	None	WebCT®, E-mail

Advanced Restorative Arts. Advanced Restorative Arts, or Restorative Arts II, is a continuation of Restorative Arts I. Students who completed Restorative Arts I bring to this course knowledge of general art principles (e.g., anatomical modeling, expression, tools, materials, and use of color and cosmetics) as applied to funeral service. In this course, color theory is emphasized using special cosmetics and lighting. Students are able to demonstrate proper restorative art techniques upon completion of this course.

The classroom version of this course was first offered in 1973, and the online version in 1999. The FSE program's two full-time faculty members developed the online version. The course is identical in content and structure to the campus course, which was developed by an instructor no longer employed by the college. Both versions of the course have the same objectives and student competencies, which are described in Appendix A. Both versions use the same textbook and the same training video. The training video, produced and distributed by an outside vendor, demonstrates restorative techniques. A part-time faculty member teaches both the campus and online versions of Advanced Restorative Arts.

Students in both sections practice techniques introduced to them in the textbook and the training video by building a canon—a life-like replica of a human head. The base product of the canon is similar in appearance to the skeletal structure of a human head and upper neck region. It is a hard polymer material with a surface that allows modeling clay to adhere to it. Students apply modeling clay to the base and shape it in ways that give it the appearance of a human head complete with ears, eyes, nose, mouth, and other shapes and contours. In applying and shaping the clay, students may use their fingers, tools used to model clay, or more common objects such as paper clips and pocketknives. After modeling the clay and allowing it to dry, students apply cosmetics to give the appearance of skin coloring. They also add artificial hair and accessories such as eyeglasses and jewelry to give the canon a more lifelike appearance.

While the course description shows the features shared by the online and on-campus versions of Advanced Restorative Arts, Table 4 highlights the differences. Students completing the classroom version of the course attend weekly lecture sessions presented in an on-campus classroom. They also attend midterm and final review sessions that are presented in the classroom. Students completing the online version do not have access to the weekly lectures, as they are not made available to them. They may travel to campus to attend optional midterm and final-exam review sessions that are presented in a classroom.

To measure learning outcomes, all students take midterm and final exams, and complete the canon project. Students completing the online course travel to campus to complete the midterm and final exams. Students complete their canons at midterm exam time, using the on-campus midterm review as laboratory time to complete the project and get assistance from the instructor. While the canons are graded at midterm, students may re-do them by final exam and have the canons re-graded in anticipation of receiving a higher score.

Table 4
Characteristics of On-Campus and Online Formats of Advanced Restorative Arts Course (FSE 214)

Course characteristics	On-campus	Online
First offered	1973	Spring 1999
Enrollment	13	5
Meeting frequency	Weekly on-campus face-to-face class sessions	On-campus faculty/student sessions for orientation, midterm and final reviews, and exams
Instructor office hours	2 hours/week; 24/7 via e-mail and telephone	24/7 via e-mail or telephone
Class activities	• Modeling with wax • Lectures • Demonstrations • Application of cosmetics	Training video of modeling with wax
Lectures	Delivered each week to on-campus students in face-to-face classroom	Online content in WebCT®
Class Discussions	• Weekly in-class sessions • Midterm review session • Final review session	• On-campus midterm review session • On-campus final review session
Technologies used	• WebCT® Learning Management Software • PowerPoint® software • Whiteboard • E-mail • Telephone • Training video	• WebCT® Learning Management Software • E-mail • Telephone • Training video
Minimum technology standards	None	WebCT®, E-mail

Veterinary Technology at St. Petersburg College

Two courses from the Veterinary Technology Program at St. Petersburg College, FL, were included in the study. The courses were Animal Laboratory Procedure I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L). This section presents a detailed description of the school, the program, and the two courses.

Overview of St. Petersburg College

Brief History of SPC. St. Petersburg Junior College, located in St. Petersburg, FL, opened in September 1927 as the first community college in Florida. The initial faculty numbered 14, with a student enrollment of 102. Although SPC started as a private school, it became public in 1948 and merged with Gibbs Junior College, an African-American junior college, in 1965. As an active member of the American Association of Community Colleges (AACC), St. Petersburg Junior College has long been an advocate for the community college mission at the national level, and cosponsored a national conference with AACC in the late 1980s on "The Role of the Community College in Shaping the Nation."

Recently, the Florida legislature passed legislation permitting and encouraging the offering of a limited number of baccalaureate programs by Florida community colleges. In December 2001, St. Petersburg Junior College became St. Petersburg College (SPC) when it became the first community college in Florida to offer bachelor's degrees in specific disciplines (i.e., education, nursing, and technology). Being able to offer baccalaureate programs may have been a contributing factor in SPC experiencing its largest enrollment increase in a decade.

The SPC mission is to "provide accessible, learner-centered education for students pursuing selected baccalaureate degrees, associate degrees, technical certificates, applied technology diplomas, and continuing education within our service area as well as globally in program areas in which the College has special expertise." Despite offering baccalaureate programs, the bulk of SPC offerings and the primary focus of its mission remain consistent with the community college movement in this country. The majority of faculty hold master's degrees, and the types of degrees awarded by SPC are typical of a large urban community college (e.g., 649 Associate in Science degrees, 580 Associate in Arts degrees, and 760 certificates in 2000–2001; St. Petersburg College, 2003a).

SPC has 13 sites in the St. Petersburg district. The District Office is in Pinellas Park, and faculty development takes place at the Pinellas County Young-Rainey STAR Center in Largo. Five of the sites are traditional campuses (i.e., St. Petersburg, Clearwater, Tarpon Springs, Seminole, and at the University of South Florida in downtown St. Petersburg), while other locations house specialized programs such as health professions, corporate training, and public safety programs (i.e., Caruth Health Education Center in Pinellas Park, ICOT Center in Clearwater, and the Southeastern Public Safety Institute at the Allstate Center). Additionally, some classes meet at the Florida International Museum in St. Petersburg (St. Petersburg College, 2003a).

Enrollment and Rankings. SPC overall enrollment in 2001–2002 was 62,465—about equally split between credit and non-credit students. This enrollment ranks 30th in the nation among community colleges. SPC ranked 6th in the number of associate degrees granted in this same period. One of the strengths of the college is the health professions program, which places SPC among the top five degree producers in the nation (3rd in 2001–2002 among community colleges; St. Petersburg College, 2003a).

The student profile at SPC is diverse. In 2001–2002, the institution served more women (62%) than men (38%). Based on self-reported ethnicity, enrollments were 78% White, 10% African American, 6% Hispanic, 4% Asian, and 1% Native American. The average age of program degree seekers was 27.1 years, and 45% of SPC students benefit from state or federal financial aid. While tuition varies by program and residency, the average tuition for an in-district student is $54 per credit hour (St. Petersburg College, 2003a).

History of Distance Learning at St. Petersburg College. Distance learning began at SPC in the early 1990s. The first courses using distance learning were in English, and involved linking classes with similar classes at a Michigan college so that students and instructors could interact using the chat and e-mail tools. Today, SPC maintains a semi-autonomous *eCampus* that led the state in the number of courses offered (441) and the highest unduplicated headcount (5,816) in 2001. The eCampus supports online courses, telecourses, and tele web courses, which combine online and telecourse formats. Several degrees are offered entirely online. As of 2003, SPC offers 1 B.S. degree program (Technology Management) online, 16 A.A. degrees online, 5 A.S. degrees, including the veterinary technology degree, and 10 certificate degrees. Student support services for the eCampus include online admissions, registration, financial aid, advising, and bookstore services (St. Petersburg College, 2003b).

Veterinary Technician Program

The VT program was initiated in 1971 as the first veterinary technician program in Florida. The American Veterinary Medical Association (AVMA) accredited the program in 1978. Today, three such programs are offered in Florida. In 1994, an online version of the program was offered to meet the needs of students who could not travel to campus. Three full-time faculty members and 14 adjunct faculty members support the campus program, while 2 full-time faculty and 16 adjuncts support the online program. Four years after starting the program, 60% of the admitted students have graduated or are still enrolled. These retention figures are identical for both the campus and online programs (St. Petersburg College, 2003c).

The VT program at SPC is comprehensive and begins with the completion of 18 hours of general education courses in composition, speech, humanities, mathematics, social sciences, computer competency, and ethics. In the traditional program, these courses are scattered throughout the 2-year program. In the distance education program, however, preference is given to those who have completed these requirements before admittance into the program. If the general education requirements have not been met before admittance, the students can take these courses as they fit into their schedules. In addition to providing a measure of the students' ability to work independently in the distance program, completing the general education requirements

prior to admittance into the program allows distance students, once admitted, to focus on the knowledge and skills needed in the clinical setting where they will be required to work.

The veterinary technology course work begins with a general biology course to prepare the students with general principles and lab skills. Many of the basic principles of veterinary work are loaded up-front in the curriculum, to be revisited in more depth later. For example, anatomy and physiology, general nursing principles, and medical terminology are taught in the 1st year. Later, students become acquainted with such skills as history-taking, examination room techniques, anesthesiology, asepsis, general and surgical nursing care, dentistry, and disease in Animal Medicine I and II.

To enter year 2 of the program requires completion of the foundation set of courses in year 1. All courses in year 2 have prerequisites or corequisites, in which the courses are closely linked. For example, Animal Laboratory Procedure I (ATE 2638L) focuses on blood cell types, their pathologies, and blood-parasite diseases. Animal Laboratory Procedure Lab I (ATE 2658L) concentrates on taking blood and fluid samples, examining them with microscopy and other tests, and distinguishing normal from abnormal results. Animal Nursing and Medicine Lab I (ATE 2651L) on the other hand, builds on prerequisites and combines both knowledge and skills by combining laboratory procedures, exam room techniques, anesthesia, and principles of radiology practices utilized in veterinary hospitals. In the final term of the curriculum, the knowledge and skills learned earlier are applied to large and exotic animals.

Veterinary Technology at a Distance

The veterinary technology program started online classes in August 1994 with 23 students. The program used America Online (AOL®) for access, live chats, and message boards. The program was hosted in an area of Veterinary Information Service, a private subscription service for veterinarians that was in AOL® at that time. The program obtained approval from the Florida Post-Secondary Education Planning Commission to offer the degree statewide in early 1994, and in 1995 earned provisional accreditation from the Committee on Veterinary Technicians Education and Activities of the American Veterinary Medical Association. The success of the veterinary technology distance program encouraged other instructors and departments in the College to develop distance courses (St. Petersburg College, 2003c).

Initially, the program used AOL® as the platform for interaction with students. In the late 1990s these interactions were moved to WebCT®. Unlike many online learning programs, the veterinary technology (VT) program schedules live chat sessions once a week at specific times for each course. These chat sessions last 45 minutes, so instructors cannot simply compress 3 hours of lecture into a 45-minute text chat. The chats are used for seminar-type discussions that are very interactive. In addition, each course has a message board that organizes postings according to topics or threads. This is used for asynchronous communication and assignments.

The distance students must work in a veterinary hospital at least 20 hours per week so they have a place to perform the 200-plus required skills. Most students also visit approximately six other hospitals in order to complete all the skill assignments. The VT program has standards to ensure that the chosen hospitals have the required equipment and personnel. Staff at the hospitals must agree to help the student learn the skills being taught in the course. A licensed veterinarian, who is an AVMA member, must be willing to observe and evaluate the student's work. Student skills are also evaluated by the instructors using five methods—reflective journals, written quizzes and proctored tests, completed products such as radiographs and blood smears that are sent to the instructor by regular mail, pictures or video of the student performing the tasks, and class discussion in the chats and message boards.

The two courses studied at SPC (ATE 2658L and ATE 2651L) are offered in the students' 2nd year, when they are somewhat experienced in the program and the VT field. In addition to the selective admissions required by the college, the distance education program also requires that students have fulfilled their general education requirements. Students must have computer skills, access to the Internet, and a subscription to the Veterinary Information Network (VIN), which offers resources, consultations, bulletin boards, classifieds, and other professional opportunities for those in veterinary practice. Additionally, students must be employed by a veterinary practice that is supportive of their learning efforts and willing to allow students to perform clinical instructional requirements under their supervision.

Table 5 shows a comparison of the online and classroom versions of Animal Laboratory Procedure I Lab and the Animal Nursing and Medicine Lab I. The curriculum has been built to be highly consistent between the classroom and online versions of each course in the program. Thus, the same outcomes are met regardless of format. The distance courses are taught online using the WebCT® learning management software. The WebCT® course area contains lecture notes and syllabi as text documents, plus WebPages™—a chat space. It also includes WebBoard™, another learning management software product, and electronic grade books. In addition, students are required to register with VIN—an online information service for veterinarians. A division of VIN, the Veterinary Support Personnel Network (VSPN) contains areas designed just for veterinary technicians, assistants, and practice managers. Within VIN, students can connect with clinics, ask technical questions of each other and other practitioners, access resources, and look for jobs.

Online students complete proctored midterm and final exams at a location that has been approved by the program director. The exams are mailed to the proctor with instructions that ensure that the student takes the test and returns it to SPC in a timely matter. In both campus and online courses, skills are assessed for mastery. Development of the skill occurs through repetition until the instructor or clinical staff member certifies that the skill can be performed.

Table 5
Characteristics of On-Campus and Online Formats of the Veterinary Technology Courses (ATE 2658L and ATE 2651L)

Course characteristic	On-campus	Online
First offered	1971	1994
Enrollment	20 max	Same
Meeting frequency	Twice weekly	Twice weekly synchronous chats and asynchronous discussions
Instructor office hours	1 hour/week; 24/7 via e-mail	24/7 via IM, e-mail, and telephone
Lecture	On-campus lecture-discussions supplemented with HTML and PDF files on the Web.	Web-based HTML and PDF files exhibit/explain skills to be performed.
Class activities	• Skills performed in on-campus lab. • Evaluated by instructor observation using an assessment rubric.	• Video demonstrations mailed to students. • Skills performed in veterinary facility. • Mastery confirmed by veterinarian/supervisor observation. • Samples may be prepared and submitted for campus instructor evaluation.
Class discussions	• Weekly in-class sessions	• Weekly discussions in WebCT® • Lesson discussions in WebCT®
Tests/quizzes/exams	• Projects • Quizzes • Midterm exams • Final exam	• Projects • Quizzes • Midterm exams (proctored) • Final exam (proctored)
Technologies	• WebCT® • HTML and PDF Files • E-mail • Telephone • Clinical instrumentation	• WebCT® • HTML and PDF Files • E-mail • Telephone • Clinical instrumentation
Minimum technology standards	• WebCT® • E-mail	• WebCT® • E-mail

Landscape & Horticultural Technology at County College of Morris

One course from the Landscape and Horticultural Technology program at County College of Morris—Landscape Design and Planning I—was included in the study. This section presents a detailed description of the school, the program, and the course.

Overview of County College of Morris

Brief History of County College of Morris. County College of Morris (CCM) is located in Randolph, NJ. CCM first opened its doors to students in 1968 and is accredited through the Middle States Association of Colleges and Schools. Various programs offered by the college are also accredited by outside agencies, such as commissions and professional associations.

CCM offers parallel degree, career and professional degree, certificate and non-credit certificate, dual enrollment, and distance learning programs. Acceptance into credit courses and programs of study leading to a degree or certificate requires students to have a high school diploma, General Equivalency Diploma (GED), Home School Certificate, or "demonstrated ability to benefit from post-secondary studies." In the last 10 years, CCM has graduated more students than any other community college in the state of New Jersey.

In 2003, there were 8,600 student enrollments, with 50% of the students attending classes full-time and 50% part-time. The majority of the student population is 20 years of age or younger (44%). The remainder is made up of those who are ages 21–34 (37%), and age 35 and older (19%). Minority student enrollment is 25%.

Distance Education at County College of Morris. CCM offers telecourses, online courses, interactive television, and courses at off-campus locations (e.g., public high schools, workplaces). The college first offered online courses to students in fall 1998. Six courses were offered, with 67 student enrollments. As of fall 2003, 69 courses were offered, with 1,356 student enrollments.

CCM is a member of the New Jersey Virtual Community College Consortium (NJVCCC), a partnership of 19 New Jersey community colleges. NJVCCC enables students to take approved online courses from participating colleges and then have the courses credited to their "home" college transcript. Through NJVCCC, CCM offers a variety of online courses in areas such as information technology, psychology, mathematics, and English.

CCM expects students to be familiar with their own computer and the Internet. Students are also responsible for their own hardware and software. The college offers technical support as needed. For a student to complete an online course, they must have access to a PC running Windows 98, ME, NT, or 2000 (a Pentium or equivalent processor at 166 MHz or better) or a Macintosh system 7.5 or higher. They must also have a modem or other device capable of connecting to the Internet at 56K or better, an Internet Service Provider (ISP), the Netscape 4.05 to 4.7s Web browser, Microsoft® Word software, and an e-mail account. Since many of the online courses incorporate video, audio, and multimedia presentations, CCM recommends that students planning to take multiple online courses invest in high-speed cable/DSL service.

Landscape and Horticultural Technology Program

The Landscape and Horticultural Technology (LHT) program began in 1980 to meet the needs of students who lived in the local area. The next closest program of its kind was at a college in an adjacent county. Students first graduated from the program in 1982. The program offers two associate degrees and seven certificates (four career and three apprenticeships). Each of the degree and certificate options emphasizes the development of technical skills. Each option also provides students an education in fundamental entrepreneurial skills, leadership skills, and problem-solving skills necessary to plan, establish, or manage a small, privately owned agricultural/horticultural business. These options have been designed to prepare students for employment in specialized occupations in the field of agriculture/horticulture in the state of New Jersey. LHT graduates acquire jobs in agribusiness (i.e., nursery and garden-center retail operations, wholesale and retail equipment and supply companies, and floral shops) or landscape management and design (i.e., turf management, landscape management, and landscape design and construction).

A lay advisory committee, composed of 10 to 12 professionals in the horticulture industry, provides oversight for the program. The committee assists the LHT program administrators and instructors with keeping programs current with technical advancements and requirements for specific skills and training in the horticulture industry. The current committee includes the president of a national landscaping association, a state agriculture extension representative, a graduate of the program, an agriculture teacher, a high school guidance counselor, and several business owners. The terms of individual members vary from 1 to 3 years.

LHT offers two A.A.S. degrees (Agribusiness, and Landscape Management & Design), four career certificates (Landscape Design, Grounds Maintenance, Landscape Contractor, and Garden Center), and three apprenticeships (Horticulturist, Landscape Technician, and Management Technician). Though the LHT program coordinator has written one of the licensing exams that LHT graduates take, the LHT program curriculum is not developed around any licensing or testing standards or requirements. Instead, the curriculum is periodically adjusted to be consistent with current industry practices.

For admission to the program, a student must have a high school diploma or high school equivalency certificate. LHT has open, rolling student enrollment. The majority of students enter the program in September of each year. On being admitted to the program, all students take an Accuplacer® test, which determines whether they need to complete remedial course work.

The majority of students in the program are employed. Of the students completing courses at night, 100% work at full-time jobs. Of those who complete courses during the day, 60% work part-time. Nearly 10% are self-employed.

Campus and online students tend to live within a 30-mile radius of the college. Students taking online courses reported they choose to do so because of the commute time from their homes to campus. Because CCM is located in the New York City collar area, the commute time can easily extend to 2 or more hours one way, depending on the time of day, traffic, and road conditions.

Associate in Applied Science Degree. LHT offers the Agribusiness Associate in Applied Science Degree and the Landscape Management and Design degree. About 100 students are currently enrolled, and enrollment averages from 80 to 100.

Students complete 65 semester hours of course work for the Agribusiness degree and 66 semester hours for the Landscape Management and Design degree. The degree programs consist of general course work in English, health and wellness, math, psychology, and science, as well as approved electives in humanities; elective course work in business; and specialized agribusiness course work (e.g., Plant Science I, Horticultural Soils, and Plant Pest Management) or landscape management and design course work (e.g., Plant Science I, Landscape Construction & Equipment, and Cooperative Agricultural Experience). Students in both programs are also required to complete a 300-hour (minimum) internship, which may be paid or unpaid at the discretion of the internship sponsor. The program initiates contact with perspective sponsors for the students.

To graduate from the college and program, students must earn a cumulative GPA minimum of 2.0 and complete the general and prescribed curriculum course work for their chosen degree. At least 30 semester hours for their major (i.e., agribusiness, landscape management and design) must be completed at CCM.

Landscape and Horticultural Technology Certificates. LHT offers four certificates to students—Landscape Design, Grounds Maintenance, Landscape Contractor, and Garden Center. The certificates are designed for present or future professionals in the industry who want to improve their technical knowledge and skills. The curriculum is a balance of theory and hands-on experience. Students complete projects using campus facilities such as the greenhouse, plant preparation laboratory, and computer lab. The certificate programs are designed primarily for part-time students working or planning to work in one of the four certificate areas. Students are able to complete any of these certificates within 3 years by attending evening classes, or within a shorter period of time by attending day classes. Students must complete 15 semester hours of course work for the Landscape Design certificate, 16 for the Grounds Maintenance and Landscape Contractor certificates, and 17 for the Garden Center certificate.

Horticultural Apprenticeships. CCM is an educational provider for the state of New Jersey Horticultural Apprenticeship Program sponsored by the New Jersey Department of Labor. This program, which allows student to combine on-the-job training with college course work, is a partnership between the employer, student/employee, and the educational provider. CCM makes three apprenticeship programs available to students: Horticulturist, Landscape Technician, and Management Technician. The Horticulturist apprenticeship is a 3-year program that prepares students for nursery and related productions; the Landscape Technician apprenticeship is a 2-year program that prepares students for design/build occupations; and the Management Technician apprenticeship is a 1-year program that prepares students for landscape maintenance occupations.

Landscape and Horticultural Technology at a Distance

LHT first began offering online courses to students in 1999, with the first course offering being AGR114—Landscape Plant Identification Management and Use. At that same time, other courses offered through the program were Web-enhanced. Because of student demand, LHT now offers six online courses. Unlike campus-based courses, the online courses are not offered according to a predetermined course rotation schedule (i.e., each fall or spring semester); rather, they are made available on a semester-by-semester basis as student demand dictates. The schedule of online courses is determined at least 12 months in advance of proposed offering dates.

The LHT program requires students who complete online courses to come to campus for at least one assessment session during a semester. The assessment may consist of an exam, interview, or review of a student project. In addition, students completing online courses can voluntarily choose to go to campus to use facilities that are also made accessible to students who complete course work in on-campus classrooms.

Landscape Design and Planning I. The LHT program teaches Landscape Design and Planning in a sequence of two courses: Landscape Design and Planning I, and Landscape Design and Planning II. This two-course sequence is included in the curricula for the Landscape Management and Design associate degree, and the Landscape Design and Landscape Contract certificates. The classroom version of the Landscape Design and Planning I course included in this study was first offered to students in 1981, and the online version was first offered in 2002.

Both versions of Landscape Design and Planning I have evolved, with modifications to incorporate new industry trends and methodologies. The classroom version has been enhanced by the addition of a real-world case study, more presentation techniques units, and the incorporation of online enhancements. The major modification made to the online course since its first offering is the inclusion of regularly scheduled, face-to-face meetings between the instructor and individual students. This change was made at the request and encouragement of the students. Other minor changes have been made to ensure that the online delivery of instruction is as close as possible to the face-to-face delivery.

Both versions of the course have recently been enhanced with the addition of the DynaSCAPE™ Garden Graphics—design software created to handle all elements of a mid- to high-end residential landscape project (e.g., plant material, outdoor lighting, water features, and wood construction). This state-of-the-art software is used by innovative industry professionals as well as nationally ranked universities (e.g., The Pennsylvania State University and California Polytechnic State University) and community colleges with reputations as innovators in preparing students for careers in the horticulture industry (e.g., Pima Community College and South Seattle Community College). Copies of the software are loaded on the computers in the LHT computer laboratory and made available for remote access via a proxy server. Students can also choose to purchase a copy for their personal use at a highly discounted cost through an arrangement between the college and the manufacturer.

A detailed course description showing the common features of the online and on-campus versions of Landscape Design and Planning I is provided in Appendix A. Both versions have the same course objectives and student competencies. Students learn to apply the design process, as a problem-solving process, to produce finished designs that can be used commercially for promoting the sale of landscape products and services. The same textbook is used for both versions, and all students complete the same weekly reading assignments. To assess learning outcomes, students in both versions complete the same quizzes, midterm examinations, final examinations, lab projects, and final design project. Students in both classes also present their final design projects to members of the lay advisory committee who provide feedback on how students can best improve their designs.

Table 6 highlights the differences in the online and classroom versions of Landscape and Planning I. Students completing the classroom version of the course attend twice-weekly labs and once-a-week lectures presented in an on-campus classroom. Students completing the online version also review lectures made available to them in a text format and visit instructor-identified Web sites. They can also choose to attend the on-campus lab sessions. Students with more experience in the industry or more experience with computers and the online environment tend to participate in the on-campus lab sessions less often than those with less experience. LHT has an open-door policy that provides all students, on-campus and online, access to on-campus facilities.

Students completing the classroom version interact with the instructor in the classroom every week the course meets during the semester. They are also able to meet one-on-one with the instructor on campus during scheduled office hours or by appointment. Students completing the online version do not have the same level of weekly instructor interaction as the on-campus students in terms of immediate access in the classroom or scheduled office hours. These students can, though, choose to attend the weekly on-campus instructor-led lab sessions or schedule an appointment as needed. All students have access to the instructor 24/7 via e-mail, and also by telephone during Monday through Friday daytime work hours.

Students completing the classroom version also interact with other students in the course, as well as with other program staff and the college, in general. The classroom students work together to take initial field measurements of the field study site and develop a client questionnaire. They are encouraged to share their progress with each other for the duration of the course. Students completing the online version have significantly less interaction with other students—both those completing the online course and those in the classroom version. Interactions between the online students occur in an online discussion forum and face-to-face if, and when, they attend the weekly on-campus lab sessions.

Table 6
Characteristics of On-Campus and Online Formats of Landscape Design and Planning I Course (AGR 211)

Course characteristic	On-campus	Online
First offered	September 1981	Fall 2002
Modifications made since first delivery	Added "real" case study, more presentations, presentation techniques unit, development of course online enhancements	• Scheduling of regular face-to-face meetings with instructor • Online course alignment with face-to-face course
Meeting frequency	• Twice weekly class sessions • On-campus lab session Monday evenings	• Review online lectures weekly • Visit embedded Web links • On-campus lab session Monday evenings (optional)
Technical support	Course instructor	College IS department
Course objectives (performance terms)	• Complete all lab assignments and submit each prior to the due date • Participate in twice weekly discussion topics • Complete all homework assignments	• Log on to the course at least three times per week • Complete lab assignments and submit prior to the due date • Participate in twice weekly discussion topics • Complete all exams and homework assignments • Arrange to meet with the instructor at least twice during the semester
Class activities	• Participation in lecture discussions • Completion of lab assignments • Site visits to field study • Presentations throughout semester	• Participation in online discussion forum • Completion of lab assignments • Site visits to field study • Presentation at end of semester
Presentations	• Periodically students present parts of the design process for the field study • Final presentation to Advisory Committee	• Final presentation to Advisory Committee
Class discussions	Face-to-face discussions	Required participation in online discussion forum
Innovative sessions (non-lectures)	• Field study site visits • Online enhancements • Collaborative field project	• Field study visits • Collaborative field project facilitated with online discussion forum
Technologies used	• PowerPoint® • Internet as search tool • Overhead projector • WebCT®	• WebCT®

FINDINGS

Funeral Service Education (Jefferson State Community College)

Student Characteristics

Table 7 shows the gender and race distributions of the students enrolled in Embalming II and Restorative Arts II during summer 2003. The enrollment in the on-campus section of Embalming II (20) exceeded the enrollment in the online section (9). Seventeen of the 20 on-campus students participated in the study, while all 9 of the online students participated. For both courses, the on-campus versions had a greater percentage of female students (Embalming II, 58.8%; Restorative Arts II, 77.8%) than the online version (Embalming II, 33.3%; Restorative Arts II, 40%). For both courses, ethnic minorities are better represented in the on-campus versions (Embalming II, 47.1%; Restorative Arts II, 55.6%) than in the online versions (Embalming II, 22.2%; Restorative Arts II, 40%).

Table 7
Gender and Race of Students Enrolled in On-Campus and Online Formats of Embalming II (FSE 202) and Restorative Arts II (FSE 214)

Embalming II	On-campus		Online	
	n	%	*n*	%
Gender				
Male	7	41.2	6	66.7
Female	10	58.8	3	33.3
Race				
Unknown	1	5.9	2	22.2
White	8	47.1	5	55.6
Black	7	41.2	2	22.2
Native American	1	5.9	0	0

Restorative Arts II	On-campus		Online	
	n	%	*n*	%
Gender				
Male	2	22.2	3	60
Female	7	77.8	2	40
Race				
Unknown	1	11.1	1	20
White	3	33.3	2	40
Black	5	55.6	2	40

A comparison of the workload, course load, and work experience of online and on-campus students yielded no significant differences in either the Embalming II or the Restorative Arts II courses (see Table 8). Since all FSE students must hold apprenticeships of a minimum of 30 hours per week, it is not surprising that there is no significant difference in the number of hours that online and on-campus students worked in the funeral service industry. Likewise, since the FSE program is very structured in the course load that students take each semester, it is not surprising that there is no significant difference in the academic course load of online and on-campus students. Interestingly, there was no significant difference in the number of hours worked by online and on-campus students in jobs outside the funeral service industry. This finding is consistent with the evidence that many student apprenticeships were unpaid and needed to be supplemented with additional income. The lack of a difference in the years of experience in the online and on-campus students may be attributed to the fact that graduation from an accredited funeral service program is a requirement for licensing in the funeral service industry. Thus, unlicensed individuals may work in the industry, but once they decide to make a career of it, they must enroll in a formal program of study and become licensed.

Table 8
Work Experience and Courseload of Students Enrolled in On-Campus and Online Formats of Embalming II (FSE 202) and Restorative Arts II (FSE 214)

Embalming II	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Hours/week in funeral home	16	37.19	15.01	9	37.44	13.18	68.00	0.642
Hours/week outside funeral home	10	27.60	15.09	5	32.00	13.51	74.00	0.888
Years in funeral service	17	6.06	7.48	9	3.78	2.17	74.50	0.913
Credit-hour enrollment	15	11.27	4.85	8	8.75	4.59	59.00	0.339

Restorative Arts II	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Hours/week in funeral home	8	30.50	8.32	5	35.00	10.00	14.50	0.278
Hours/week outside funeral home	4	31.25	11.82	3	33.33	11.55	18.00	0.516
Years in funeral service	7	3.71	3.40	5	4.40	1.95	11.50	0.132
Credit-hour enrollment	9	12.89	2.89	4	12.25	2.87	16.00	0.336

Note: Values in bold type are significant at $p > .05$.

Comparisons of Motivation, Learning Strategies, CISS, and Achievement

Motivation differences. Students enrolled in both sections completed a motivation instrument at the start of the course. Table 9 shows the average motivation scores (range = 1 to 7) in four areas: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. For both Embalming II and Restorative Arts II, significant differences were found between online and on-campus students in the areas of self-efficacy and test anxiety. In both courses, online students scored higher on self-efficacy than on-campus students, while campus students scored higher on test anxiety. A significant difference also existed for the task value for Embalming II students, with online students scoring higher than on-campus students. No significant difference was found in the areas of intrinsic goal motivation, extrinsic goal motivation, or control of learning beliefs.

Learning strategy differences. Students completed a learning strategies and course experience instrument at the end of the course. The learning strategies instrument measured two areas: time and study environment, and effort regulation. As shown in Table 9, the learning strategies average scores did not differ significantly. Students in the online and on-campus formats of both courses scored high in both time and study environment and effort regulation.

Course experience differences. The CISS instrument measured four areas (range = 1 to 4): student–student and student–instructor interaction, department and instructor support, course structure, and transactional distance. As shown in Table 9, no significant difference was found between online and on-campus students in either course for any of the four areas of course experience, except for transactional distance in the Restorative Arts II course, where the campus students reported feeling closer to their instructor, program, and college than the online students. Since on-campus students had the opportunity to interact with the course instructor and each other weekly in the classroom, and neither online course provided tools for interaction or collaboration, it is not surprising that there was a significant difference in transactional distance. The lack of difference in reported student experiences of department and instructor support and course structure are expected, since both versions of both courses have the same structure and support resources.

Student achievement differences. Table 9 shows the average students' scores on course assessments. No significant differences were found in the scores of online and on-campus Restorative Arts II students in the pretest, posttest, course project (canon), midterm exam, or final exam. A significant difference was found in the midterm exam scores of the Embalming II online and on-campus students, but not in the pretest, posttest, or final exam grades. Whatever edge online students had at mid-term was lost by the final exam.

Table 9

Motivation, Learning Strategies, CISS, and Achievement Scores for On-Campus and Online Formats of Embalming II (FSE 202) and Restorative Arts II (FSE 214)

Embalming II	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Motivation								
Intrinsic goal orientation	17	5.35	1.21	9	6.19	0.77	49.50	0.143
Extrinsic goal orientation	17	5.54	1.25	9	5.56	0.92	72.50	0.828
Task value	17	5.95	0.82	9	6.57	0.36	40.00	**0.048**
Control of learning	17	5.72	0.91	9	6.39	0.47	43.50	0.073
Self-efficacy	17	5.26	1.03	9	6.17	0.94	37.50	**0.035**
Test anxiety	17	4.98	1.82	9	3.84	1.29	36.50	**0.031**
Learning strategies								
Time & study environment	17	4.99	0.87	9	4.46	0.92	52.50	0.195
Effort regulation	17	5.57	0.90	9	5.50	0.99	74.50	0.913
CISS								
Course interaction	17	3.11	0.31	9	3.99	0.21	71.00	0.760
Course support	17	2.92	0.22	9	2.78	0.20	52.50	0.180
Course structure	17	3.00	0.27	9	2.89	0.43	62.50	0.436
Transactional distance	15	2.13	0.46	8	1.79	0.26	33.00	0.072
Achievement								
Midterm score	17	73.65	10.30	9	83.78	8.17	30.50	**0.013**
Final exam score	17	73.18	10.62	9	78.11	8.40	51.00	0.169
Pretest score	17	30.39	21.10	9	44.44	16.43	47.50	0.116
Posttest score	17	81.21	14.08	9	82.41	9.21	773.50	0.870
Course quality								
Quality of the teaching	17	3.88	0.78	9	3.89	0.60	75.00	0.93
Quality of the course	17	3.88	0.78	9	3.89	0.60	75.00	0.93
Restorative Arts II	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Motivation								
Intrinsic goal orientation	8	5.66	0.95	5	6.20	0.89	12.50	0.270
Extrinsic goal orientation	8	5.00	1.28	5	5.65	1.49	14.00	0.376
Task value	8	5.90	0.94	5	6.70	0.51	8.00	0.074
Control of learning	8	6.00	0.99	5	6.65	7.83	11.00	0.165
Self-efficacy	8	5.22	0.96	5	6.43	1.29	6.00	**0.037**
Test anxiety	8	4.58	1.35	5	3.52	2.34	13.50	**0.034**
Learning strategies								
Time & study environment	9	4.94	1.06	5	4.40	1.20	18.00	-0.601
Effort regulation	9	5.19	1.12	5	5.65	0.86	17.00	-0.742
CISS								
Course interaction	9	3.37	0.36	5	3.03	0.33	12.00	0.155
Course support	9	3.08	0.42	5	2.97	0.24	21.00	0.838
Course structure	9	3.26	0.39	5	3.13	0.51	17.50	0.492
Transactional distance	9	2.48	0.40	5	1.77	0.32	4.50	**0.015**

Achievement								
Project score	9	88.11	6.27	5	89.00	5.48	21.00	0.834
Final exam score	9	83.67	10.36	5	82.80	22.39	16.00	0.383
Pretest score	9	7.42	14.70	5	0.00	0.00	15.00	0.163
Posttest score	9	45.68	17.07	5	53.33	19.88	15.00	0.305

Note: Values in bold type are significant at $p > .05$.

Veterinary Technology Program (St. Petersburg College)

Student Characteristics

Although the delivery format varies, the outcomes for the online and campus-based programs are identical, so students can choose the delivery format that best fits their needs. To control for student self-selection, students were surveyed at the beginning of the courses to determine demographic background, employment workload, course workload, and experience in the field of study. Prior knowledge was measured by administering a pretest. As shown in Table 10, the demographic compositions of the online and on-campus cohorts were quite similar for two selected courses.

Traditionally, two-thirds of the on-campus students are from out of state and one-third of the students are in state. Students in the Animal Technology veterinary technician program are primarily White and female. (G. Hancock, personal communication, August 5, 2003). Fewer than 15% of those students who reported their gender and ethnicity were non-White across both classes and delivery format, with no pattern of preference evident. Less than 5% of the students were male. This is not inconsistent with national statistics in health profession careers (National Center for Education Statistics [NCES], 2002).

Institutional data indicate that students in on-campus and online classes have similar GPAs (Table 11). However, the data also highlight differences between online and on-campus students with respect to age and credit hours earned. Online students are 3 to 4 years older than campus students, on average, and have completed three to four credit hours more than campus students

In addition, students differ significantly in their amount of work experience in the veterinary field. Students were asked about their experience in the field, employment history, and credit-hour enrollment in order to determine whether differences exist between students who select the online program and those who select the on-campus program. Students in the online courses work many more hours in veterinary clinics than the students in the campus-based courses. In contrast, the students in the campus-based courses work more hours than the online students in jobs that are *unrelated* to the veterinary field. Students in the online versions of Animal Laboratory Procedure I and Animal Nursing and Medicine Lab I averaged over 30 hours per week in veterinary clinics, while those students in the on-campus versions of these courses worked about 16 hours per week in the clinics. At the same time, the on-campus students spent about 12–15 hours working *outside the field*, while the online students spent very little time working on jobs that were unrelated to their field of study. These results are summarized in Table 12. Taken together, online students spend considerably greater time in clinical settings

with fewer employment distractions. Additional time on task in authentic settings may provide online students with additional skills development.

Table 10
Gender and Race of Students Enrolled in On-Campus and Online Formats of Animal Laboratory Procedures Lab I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L)

Animal Laboratory Procedures Lab I	On-campus		Online	
	n	%	*n*	%
Gender				
Unknown	4	10.8	9	37.5
Male	1	2.7	0	0.0
Female	32	86.5	15	62.5
Race				
Unknown	3	8.1	9	37.5
White	30	81.1	14	58.3
Black	3	8.1	0	0.0
Asian	0	0.0	1	4.2
Hispanic	1	2.7	0	0.0

Animal Nursing & Medicine Lab I	On-campus		Online	
	n	%	*n*	%
Gender				
Unknown	2	6.5	16	45.7
Male	0	0.0	1	2.9
Female	29	93.5	18	51.4
Race				
Unknown	3	9.7	16	48.5
White	25	80.6	16	48.5
Black	2	6.5	0	0.0
Asian	0	0.0	1	3.0
Hispanic	1		1	2

Table 11
GPA, Earned Credit Hours, and Age of Students Enrolled in On-Campus and Online Formats of Animal Laboratory Procedures Lab I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L)

Animal Laboratory Procedures Lab I	On-campus		Online	
	M	*SD*	*M*	*SD*
GPA	3.1	0.4	3.3	0.3
Credit hours earned	96.3	36.8	99.8	34.1
Age	27.3	6.9	30.2	8.5

Animal Nursing & Medicine Lab I	On-campus		Online	
	M	*SD*	*M*	*SD*
GPA	3.1	0.3	3.1	0.5
Credit hours earned	95.4	34.1	99.3	33.5
Age	26.9	6.2	31.2	8.5

Table 12
Work Experience and Courseload of Students Enrolled in On-Campus and Online Formats of Animal Laboratory Procedures Lab I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L)

Animal Laboratory Procedures Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Hours/week in vet clinic	11	16.00	14.16	11	31.64	11.83	24.50	**0.02**
Hours/week outside vet field	10	12.20	17.97	9	0.00	0.00	27.00	**0.04**
Years in vet field	11	2.64	2.83	11	7.27	4.76	20.00	**0.01**
Credit-hour enrollment	11	10.18	3.06	11	6.36	1.57	16.50	**0.00**

Animal Nursing & Medicine Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Hours/week in vet clinic	9	16.89	16.89	17	33.35	9.64	32.50	**0.02**
Hours/week outside vet field	8	15.00	21.88	15	2.73	4.15	55.00	0.72
Years in vet field	9	2.53	2.88	17	6.79	5.80	26.50	**0.01**
Credit-hour enrollment	9	11.00	2.65	16	6.88	1.45	12.50	**0.00**

Note. Values in bold type are significant at $p > .05$.

There was also a significant difference in the number of years spent working in the veterinary field and the number of credit hours taken during the semester. The online students, on average, have about 4 more years of experience in the veterinary field than the on-campus students. Student experience in the veterinary field and credit-hour enrollment are not significantly different between online and on-campus students in this study. On average, the students in the on-campus program enrolled in nearly twice as many credit hours per semester than online students. These differences in work experience in the veterinary field may explain why the online program students have outperformed the campus-based students on the national certification exam in five years of the six year period from 1998-2003 (see Figure 1).

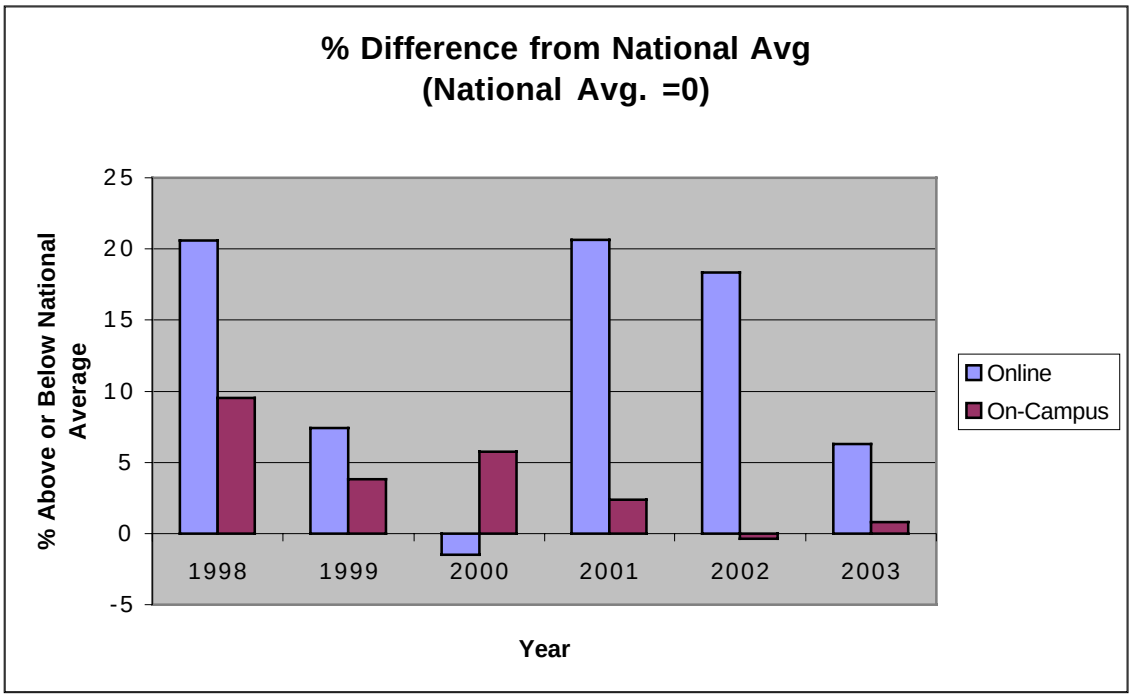

Figure 1. AVMA Veterinary Technician National Exam mean score variance of St. Petersburg College online and on-campus veterinary technician program graduates (1998–2003)

Comparisons of Motivation, Learning Strategies, CISS, and Course Experiences

To further compare the online and the on-campus students, data were collected to determine the students' motivation to learn, their preference for various learning strategies, their observations of the interaction, structure, and support within the course, and their feelings of closeness to the instructor and other students (see Table 13). The MSLQ and CISS instruments were used to collect these self-reported measures.

Table 13

Motivation, Learning Strategies, CISS, and Course Quality Scores for On-Campus and Online Formats of Animal Laboratory Procedures Lab I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L)

Animal Laboratory Procedures Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Motivation								
Intrinsic goal orientation	11	5.52	0.73	11	6.02	0.68	36.50	0.111
Extrinsic goal orientation	11	4.95	1.15	11	4.80	1.33	56.50	0.792
Task value	11	6.42	0.73	11	6.44	0.83	60.50	1.000
Control of learning	11	5.57	0.87	11	6.14	0.60	35.50	0.098
Self-efficacy	11	5.59	1.19	11	6.25	0.83	40.00	0.176
Test anxiety	11	3.93	1.39	11	1.89	0.97	31.50	0.055
Learning strategies								
Time & study environment	39	5.54	0.99	13	6.23	0.64	153.50	**0.034**
Effort regulation	38	5.34	0.82	14	5.65	0.77	209.00	0.239
CISS								
Course interaction	38	3.20	0.37	14	3.12	0.38	238.50	0.562
Course support	37	2.85	0.35	13	2.77	0.31	215.00	0.566
Course structure	38	3.24	0.35	14	3.18	0.37	250.50	0.743
Transactional distance	39	2.14	0.56	14	2.27	0.55	234.50	0.431
Course quality								
Quality of the teaching	37	4.65	0.48	14	4.50	0.76	244.50	0.71
Quality of the course	37	4.62	0.49	14	4.57	0.65	257.50	0.97
Animal Nursing & Medicine Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Motivation								
Intrinsic goal orientation	9	5.75	0.88	17	5.96	0.50	67.00	0.602
Extrinsic goal orientation	8	5.19	1.24	17	5.09	1.35	66.60	0.930
Task value	9	6.44	0.69	17	6.62	0.52	69.50	0.696
Control of learning	9	5.75	0.86	16	5.86	0.61	68.00	0.819
Self-efficacy	9	5.79	1.15	17	6.29	0.57	59.00	0.343
Test anxiety	9	4.60	1.64	17	3.27	1.49	39.00	**0.043**
Learning strategies								
Time & study environment	33	5.51	1.12	20	5.94	0.94	256.00	0.172
Effort regulation	34	5.17	0.99	20	5.53	0.81	263.50	0.170
CISS								
Course interaction	34	3.18	0.38	20	3.06	0.35	284.00	0.310
Course support	32	2.86	0.33	20	2.84	0.23	319.50	0.992
Course structure	34	3.24	0.34	20	3.16	0.34	303.00	0.498
Transactional distance	34	2.23	0.56	20	2.06	0.42	256.00	0.126
Course quality								
Quality of the teaching	30	4.43	0.73	18	4.39	0.70	257.00	0.76
Quality of the course	30	4.40	0.77	18	4.44	0.62	268.00	0.96

Note. Values in bold type are significant at $p > .05$.

Motivation and learning strategy differences. Table 13 shows that student motivation for learning is not significantly different between online and on-campus formats. Both groups of students indicated high levels of motivation in terms of their goal orientation, the value they placed on the course, their control of learning, and self-efficacy. Both groups of students also indicated considerable test anxiety.

Learning strategy differences. As shown in Table 13, there was little difference in the learning strategies students reported using in their course. The online students in Animal Laboratory Procedures Lab I course did report significantly greater use of learning strategies that address time issues and their study environments. It is unclear if this difference were due to the characteristics of the course or the delivery format.

Course quality differences. As with the motivation and learning strategies variables, there was no difference in the online and on-campus students' perceptions of the interaction that occurred within the course, the overall support and structure of the course, their feelings of closeness to the instructor and the other students, and their perceptions of the overall quality of the teaching and the course (see Table 13). This finding of no differences is important because it supports the view that online courses have the potential to be equal to on-campus courses in terms of student interaction and course quality. The lack of differences also suggests that even though the students are separated by time and space in an online course, they are still able to develop feelings of closeness with their instructor and other students that are equal to those reported in the campus-based courses.

The structure and processes employed in the veterinary technology (VT) program at St. Petersburg College (SPC) may contribute to the lack of difference in the students' perceptions of interaction, support, structure, and transactional difference in these courses. First, the VT program is highly coordinated with a high degree of standardization in terms of course format and delivery. Second, instructors in the course often rotate through a variety of the courses, which contributes to high familiarity with student experiences in the courses they are not currently teaching. Finally, while a strict cohort is not maintained, student familiarity with each other is evident from a review of the synchronous and asynchronous communication logs. Each of these factors may contribute to a sense of community in the online program that is similar to that of campus programs.

Student Achievement Differences

The primary focus of this study was to examine the achievement of the students in terms of knowledge and skill acquisition across the two course formats. Student knowledge was measured using a pretest and posttest in both VT courses and two specialized tests in Animal Nursing and Medicine Lab I (radiological exam and nursing exam). The students' final grades were also used as a measure of achievement and performance in the two sets of matched courses. Each of the tests and exams in these skills-based courses contains a practical portion in which students demonstrate skills or identify and explain procedures at stations set up around the room. Thus, both knowledge and skills are incorporated into the achievement scores for these courses.

Students in the online Animal Nursing and Medicine Lab I course had a statistically higher score on the pretest than the on-campus students. The online students averaged 63.23% on the pretest, compared to 55.48% for the on-campus students. This suggests that the online students may have entered the course with a higher prior knowledge of course material, possibly due to the fact that they had more years of experience in the veterinary field. However, even though the online students in the Animal Laboratory Procedure Lab I course also had more years of experience than the on-campus students and outperformed the on-campus students on the pretest, the difference was not significant.

To measure overall student performance in the courses, unit tests, the final exam, and final grades were compared. In the Animal Laboratory Procedure Lab I course, the on-campus students (88.04%) significantly outperformed the online students (81.07%) on the final exam (see Table 14). However these same students did not have significantly different final grades. In the Animal Nursing and Medicine Lab I course, the on-campus and online students performed at statistically similar levels on their two unit tests, their final exam, and their final grades. One confounding factor in these results is the consistently higher standard deviations for the online courses in all performance measures, which indicates a larger spread of scores.

Table 14
Student Achievement Scores for On-Campus and Online Formats of Animal Laboratory Procedures Lab I (ATE 2658L) and Animal Nursing and Medicine Lab I (ATE 2651L)

Animal Laboratory Procedures Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Pretest score	34	32.75	10.43	23	39.17	19.19	343.00	0.298
Final exam score	24	88.04	9.10	23	81.07	10.08	159.00	**0.013**
Final grade	24	87.84	5.97	23	82.95	14.54	227.00	0.208

Animal Nursing & Medicine Lab I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Radiological exam	22	88.67	6.42	34	85.16	17.06	359.00	0.801
Nursing exam	22	92.33	9.38	34	90.89	12.39	361.00	0.827
Pretest score	28	55.48	12.71	33	63.23	13.76	322.50	**0.041**
Final exam	13	89.23	6.71	23	85.04	20.70	131.00	0.542
Final grade	22	90.29	7.26	34	88.74	14.44	350.00	0.687

Note: Values in bold type are significant at $p > .05$.

The performance results in this study are somewhat confounding. Pretest results show that students in the online courses often enter with greater prior knowledge, but the posttest results show that the campus students catch up during the semester and sometimes surpass the online students. However, the development of skills through each format, which is included in the final grade of these courses, is comparable. Each set of courses focuses heavily on skill development that builds on the knowledge gained in other courses, and appears to do so well, regardless of the format.

In addition, program data from SPC indicate that online students consistently outperform their campus counterparts on the Veterinary Technician National Exam, authored by Professional Exam Service (Figure 1). This exam measures overall knowledge in the professional area. The data may indicate that students in the online program gain increased knowledge through contextual learning in the workplace. This is supported by cognitive research showing that learning occurs best when taught in situations that are real and familiar to the student (Lave & Wenger, 1991). The benefits of contextual learning may not be readily apparent in the individual courses, but evidence through a more holistic assessment, such as the certification exam, suggest that students in the online program have a significant advantage over the on-campus students in their ultimate level of performance.

The findings described herein are limited by several factors. First, assessment of prior knowledge indicating possible advantages for online students may not be due to self-selection, but could be the result of the expanded time online students spend in contextually-based clinical settings. Second, the use of cognitive performance measures may not accurately measure the skills gained in these courses, which are so heavily focused on skill development. However, the students in this program are also graded on skills in both the on-campus and online programs. Students in the Animal Laboratory Procedure Lab I course submit a portfolio of blood smears that they have made along with their cell counts, which are then graded by instructors. Finally, future studies using courses in the 1st year of the program would provide additional insights into the results.

Landscape Design and Planning Program (County College of Morris)

Student Characteristics

At the start of the course, students enrolled in the online and on-campus versions of Landscape Design and Planning I were asked to supply demographic information (see Table 15). In both the online and on-campus courses, the number and percentage of females (8, 61.5% on-campus; 6, 60% online) exceeded the number and percentage of males (5, 38.5% on-campus; 4, 40% online). The percent of females in the on-campus course (61.6%) was comparable to the percent in the online course (60%). Overall, the findings suggest that Landscape Design and Planning II is a female-dominated course. No ethnicity data were reported.

Table 15
Gender of Students Enrolled in On-Campus and Online Formats of Landscape Design and Planning I (AGR 211)

Landscape Design & Planning I	On-campus		Online	
	n	%	*n*	%
Gender				
Male	5	38.5	4	40.0
Female	8	61.5	6	60.0

Students were also asked to report the amount of time they spent working in the horticulture or agribusiness industry, time spent working outside that industry, the number of years of experience they had in the horticulture/agribusiness industry, and the number of semester hours in which they were enrolled (see Table 16). The only significant difference between the online and on-campus students was in the number of semester hours they were enrolled, with on-campus students averaging 11.62 semester hours and online students averaging 5.70 semester hours. Both online and on-campus students worked inside and outside the horticulture/ agribusiness industry, with no significant difference in the number of hours they worked each week. Students in both courses had comparable years of experience in the horticulture/ agribusiness business industry (4.33 years, on-campus; 5.65 years, online). Differences were significant only for credit hour enrollment.

Table 16
Work Experience and Courseload of Students Enrolled in On-Campus and Online Formats of Landscape Design and Planning I (AGR 211)

Landscape Design & Planning I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Hours/week in horticulture industry	13	20.69	17.759	10	23.90	24.875	64.000	.950
Hours/week outside industry	11	13.36	10.782	10	15.85	21.082	52.000	.826
Years in industry	12	4.33	2.708	10	5.65	9.860	50.500	.523
Credit-hour enrollment	13	11.62	3.927	10	5.70	4.111	20.000	**.004**

Note: Values in bold type are significant at $p > .05$.

Comparison of Motivation, Learning Strategies, CISS, and Achievement

Motivation differences. Students enrolled in both sections completed a motivation instrument at the start of the course. Table 17 shows the average motivation scores (range = 1 to 7) in six areas: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. Students' scores in both courses were high in each area, with the exception of text anxiety, where both groups scored the lowest. Significant differences in online and on-campus scores were found only in the extrinsic goal orientation measure, with on-campus students scoring an average of 5.50 and online students scoring an average of 4.23.

Learning strategy differences. Students completed a learning strategies and course experience instrument at the end of the course. The learning strategies instrument measured two areas: time and study environment, and effort regulation. As shown in Table 17, online and on-campus student scores were high in both areas, but there was no significant difference in their scores. It should be noted that the response rates for this scale and the CISS scale discussed in the following were significantly lower than the response rate for the motivation scale.

Course experience differences. The CISS instrument measured four areas (range = 1 to 4): student–student and student–instructor interaction, department and instructor support, course structure, and transactional distance. Online and on-campus students reported midlevel scores in all four areas, but there was no significant difference in their scores, except for transactional distance (see Table 17). Although there was a significant difference in the mean values of transactional distance, both groups reported feeling low levels of transactional distance. The difference in the transactional distance scores resulted from online students reporting that they held "close" feelings toward their instructor, program, and college, while the on-campus students reported that they held "very close" feelings. Because the online and on-campus courses had common structures and support resources, it is not surprising that the course support and course structure measures were not different. Since the course interaction and transactional distance scores were not significantly different, perhaps students have similar experiences of interaction and distance in both the online and on-campus courses. The use of the online discussion forums by online students may have provided online students the appropriate level of interaction and mediated the physical distance between the online students and the instructor. Their access to the weekly on-campus lab sessions also may have contributed to the reported level of interaction and mediated distance. It should be noted that the response rates for this scale and the learning strategy scale discussed earlier were significantly lower than the response rate for the motivation scale.

Student achievement differences. Table 17 shows the average students' scores on course assessments. Online and on-campus students had significantly different scores on Quiz 1 (83.99 on-campus; 96.66 online), the Residential Design Project (66.00 on-campus; 82.44 online), and Lab 3 (92.73 on-campus; 90.00 online), but no differences on the pretest, quiz 2, quiz 3, final exam, final grade, lab 1, lab 2, lab 4 and class participation grade.

Table 17
Motivation, Learning Strategies, CISS, and Achievement Scores for On-Campus and Online Formats of Landscape Design and Planning I (AGR 211)

Landscape Design & Planning I	On-campus			Online				
	n	*M*	*SD*	*n*	*M*	*SD*	*U*	*p*
Motivation								
Intrinsic goal orientation	13	5.88	0.83	10	6.10	0.86	56.00	0.574
Extrinsic goal orientation	13	5.50	1.34	10	4.23	1.27	32.00	**0.040**
Task value	13	6.67	0.56	10	6.65	0.48	56.50	0.569
Control of learning	13	5.69	1.00	10	5.83	1.00	62.00	0.850
Self-efficacy	13	6.34	0.59	10	6.30	0.79	61.00	0.803
Test anxiety	13	3.78	1.46	10	3.38	1.11	56.00	0.574
Learning strategies								
Time & study environment	3	4.75	0.98	6	4.96	0.94	7.00	0.604
Effort regulation	3	5.42	1.13	6	5.21	1.18	7.50	0.696
CISS								
Course interaction	3	3.24	0.33	6	3.10	0.39	6.50	0.515
Course support	3	2.81	0.33	6	2.67	0.15	5.50	0.354
Course structure	3	3.39	0.25	6	3.11	0.20	3.50	0.145
Transactional distance	3	3.00	0.00	6	2.00	0.56	1.50	**0.034**
Achievement								
Pretest	12	77.92	10.54	9	78.70	13.17	51.50	0.857
Quiz 1	10	83.99	8.45	10	96.66	5.66	13.00	**0.005**
Quiz 2	12	75.99	27.75	9	86.93	13.08	42.50	0.409
Quiz 3	12	67.50	32.65	7	87.86	3.93	21.50	0.078
Residential design project	11	66.00	33.54	9	82.44	31.08	14.50	**0.008**
Final exam	10	88.00	7.42	9	82.22	31.34	34.00	0.367
Final grade	12	70.48	26.62	10	77.03	23.30	45.00	0.323
Lab 1	11	88.41	4.91	9	91.11	4.35	34.00	0.229
Lab 2	12	87.71	28.65	9	83.33	31.57	37.50	0.220
Lab 3	11	92.73	6.47	10	90.00	31.62	29.00	**0.033**
Lab 4	11	80.91	40.11	10	90.00	31.62	46.00	0.354
Class participation	12	56.67	34.73	10	65.00	34.08	50.00	0.502

Note: Values in bold type are significant at $p > .05$.

Cross-Case Analysis

This study encompassed five courses from three CTE degree programs at three different community colleges. A cross-case analysis of the multiple sites reveals interesting findings in six areas: program design, course design, student characteristics, student course experiences, skill development, and achievement.

Program Design

Each of the matched pairs of online and on-campus courses examined in this study was part of an equivalent set of online and on-campus programs. All three programs required students to complete approximately 15 hours of general education course work prior to enrolling in the programs. Unlike the courses in these programs, the general education courses were not offered online. Two of the three programs offered the online and on-campus courses in parallel, meaning that each semester an on-campus and online version of the course was offered.

Two of the three programs have curricula that were tightly aligned with state and national licensing standards and produced graduates who passed the national board exams at a higher rate than the national average. Two of the three programs have adopted a cohort approach to enrollment in both their online and on-campus programs, which facilitates building networks and community among the enrolled students.

Course Design

There were many similarities and differences in the design of the five courses studied. The online versions of all five courses were implemented using the WebCT® course management system. Three of the five online courses employed asynchronous discussion forums to facilitate interaction among the online students and between the online students and the instructor, with two of those three also employing weekly synchronous chats. None of the courses employed high-bandwidth technologies, such as computer-based simulations.

Interestingly, in three of the five courses, on-campus students had access to the online course materials and online students were allowed to attend campus class sessions. In two of the five courses, students never had to visit the college campus, while in three courses students were required to come to campus to take major examinations. In the two cases where students did not need to come to campus, testing was done at proctored sites local to the students.

Four of the five courses employed adjuncts for teaching even though full-time faculty developed the courses. In fact, the number of adjunct faculty exceeded the number of full-time faculty in the programs those courses represented.

Student Characteristics

Online and on-campus students in all three programs had experience in their field of study prior to enrolling in the program. In general, the gender distribution in online and on-campus courses varied more than the racial distribution. In three courses, more women were enrolled in the online format, while in the other two courses more men were enrolled in the online format. In all cases, there were fewer ethnic minorities enrolled in online courses than in on-campus courses.

In four of the five courses, there was no significant difference in the online and on-campus student scores on either of the two subscales of learning strategies. In one course, a significant difference was found in one of the scales (time and study environment), with the online course having the higher average score.

Six subscales of motivation were measured for students in each of the matched pairs of courses (a total of 30 subscale measures), but only five instances of significant difference were identified: extrinsic goal orientation and test anxiety, where on-campus averages were higher; and self-efficacy and task value (two instances each), where online averages were higher.

Student Course Experience

The study measured online and on-campus students' self-reported perceptions of course interaction, course support, course structure, and transactional distance. No significant difference was found in the reported measures of any of the online and on-campus pairs of students for the constructs of course interaction, course support, and course structure. Differences in feelings of closeness were found in only two courses. In four of the courses, both the on-campus and the online students reported feeling close or very close to their instructor, program, and college. In the fifth course, students provided ratings that indicated they felt slightly less close to their instructor and college than their on-campus counterparts, although the numbers in this sample were quite small. In general, the on-campus and online groups of students indicated a feeling of closeness to their instructor and their program. This finding is particularly interesting, given the online courses in this study varied from *no use* to *regular and systematic use* of synchronous and asynchronous tools to facilitate interaction and collaboration.

Skill Development

The three programs took a common approach to skill development. Each program required their students to be involved in a field experience. In one Funeral Service Education course, students were required to work a minimum of 30 hours per week in a state-mandated apprenticeship at a licensed funeral home. In Veterinary Technology (VT), students were required to enroll in a program-mandated clinical position, where they could demonstrate the skills learned in the program and submit that demonstration to their employer and instructors for evaluation. In the Landscape and Horticultural Technology (LHT) program, students were required to participate in a program-mandated mentorship relationship with a local landscaper, where they could carry out course projects.

The three programs also took a different approach to evaluating knowledge and skill acquisition in online students. In the Funeral Service Education program, students were provided with a training video that showed how to accomplish the tasks they were learning. Using the video, students completed their project in the campus lab or brought work completed at home to the lab for evaluation by the course instructor. VT program students completed course assignments at the clinical sites where they worked, and then submitted the evidence from those assignments to the course instructor for evaluation. The employer also evaluated the skills of the VT students. In the LHT case, students completed design projects in the field and brought them to campus for evaluation by the course instructor and industry professionals from the program advisory committee.

Achievement

Despite the differences in the course design and student characteristics across the five courses studied, only four instances of significant difference in student achievement in the online and on-campus courses were found among the more than 25 achievement variables measured. In two of the exceptions, the on-campus student achievement average was higher, while in the other four, the online student average was higher. Of more significance in terms of student achievement, students who completed either the online or on-campus versions of the course were likely to pass the national board exam on the first attempt. In contrast, there was a high rate of noncompletion in both the on-campus and online programs.

CONCLUSIONS

Although this study was exploratory in nature, there are several interesting findings that lead to conclusions related to the development of online instructional programs in CTE. The following conclusions are based on the data collected from the three in-depth case studies of CTE online programs in the community college. It is noted that these conclusions are tentative and preliminary due to the small sample of online programs examined in this study.

There is no common pattern or model for the delivery of online CTE programs and courses. The three case studies revealed numerous ways to implement CTE in an online environment, and each of these forms of implementation appeared to be equally successful in helping students achieve the learning objectives. The variety of approaches was particularly evident in the breadth of technologies used, the ways skills are developed, and the means of evaluation. Online CTE programs and courses rely on a variety of technologies that range from standard delivery of content in text form to high-fidelity audio and video-streaming media. The acquisition of skills occurred in a variety of ways including online tutorials, hands-on practice in campus labs, and practical experiences through paid employment. Evaluation of student learning took the form of online quizzes and tests, proctored exams at an independent testing site or place of employment, and administration of tests at the college campus.

Online CTE courses do not align with the common view that online courses provide anytime, anyplace, or any pace experiences for students. Each of the online courses examined in this study was instructor-paced throughout the academic semester, with assignments due at specific points in time. Further, all courses/programs required student employment for a minimum of 20–30 hours per week. Two of the courses included a synchronous chat component that required students to be available online at the same time each week. Even though much of the distance learning literature emphasizes the anytime, anyplace, any pace characteristics of online courses, these community colleges chose course design models that meet their need for skill training, rather than models that fully exploit the convenience features of online courses.

Online programs provide unique and flexible options for students. Because the on-campus and online courses are offered during the same semester, students benefit from the flexibility provided through the dual offerings. For example, the online students have the option of visiting campus to attend live lectures and participate in hands-on lab exercises, while the on-campus students are able to review the same Internet content that is provided to the online students. Giving the online and on-campus students the option of accessing the course materials in these different formats provides flexibility for students who may have work or family conflicts that interfere with their participation in a course. This flexibility also gives the online students the option of gaining direct access to the instructor and college facilities such as labs and library resources.

CTE students perform equally well in online and on-campus courses. Overall, this study found no difference in the student achievement measures of the online and on-campus students. This finding is consistent with other research that compared student achievement in online and on-campus courses (Russell, 2002; Web-based Education Commission, 2000), and supports the NCES (2000) claim that "distance education is just as effective as traditional education with regard to learners' outcomes" (p. 6). In fact, delivering CTE courses online appears to be an effective way for students to prepare for national board examinations. This study showed that students who completed the online courses were successful, on the first attempt, in passing the national board exam for their regulated profession when the online curricula was tightly aligned with state and national licensing standards.

Part of the reason for the lack of performance difference in online and on-campus students may be that the online CTE courses do not rely on the technology to teach the skills. Each of the courses examined in this study utilized workplace experience as a key component of student learning and skill development. Workplace experiences, when integrated into online or on-campus courses and programs, create opportunities for students to develop skills through contextualized hands-on learning (Casella & Brougham, 1995). Although online simulations have been identified as one method for providing online skill training in CTE (Johnson et al., 2003), none of the courses in this study used online simulations where students could learn and practice their skills virtually. While simulations were used in these courses, they were done in a campus lab environment or in an actual work setting. It is unclear if the lack of online simulations in CTE courses is due to the lack of availability of quality simulations that can be delivered over the Internet or because online simulations are not effective for skill training. It is also possible that online simulations are too resource-intensive in terms of cost and required support infrastructure.

Students enrolled in online CTE courses appear to be as motivated and satisfied as students enrolled in on-campus CTE courses. Overall, this study found no difference in the student motivation measures of the online and on-campus students (i.e., extrinsic goal orientation, test anxiety, self-efficacy, and task value). The results also suggest that the persistence of students in the online programs is comparable to their on-campus counterparts. This is an indication that the courses and programs assessed in this study are meeting the learning needs of both campus and online students.

CTE students in the online and on-campus courses also experience comparable feelings of closeness to their instructors. Overall, there was no difference in perceptions of transactional distance (i.e., feelings of closeness to the instructor) for online and on-campus students. The fact that online students' feelings of closeness to their instructors, program, and college are equivalent to the feelings of the on-campus students is particularly encouraging for community colleges concerned about establishing and maintaining connections to their graduates. The online course instructors included in this study used online technologies such as e-mail, and more traditional technologies such as the telephone to connect with their students.

Online CTE courses extend the service area of their home institutions by allowing students to enroll in programs of interest that are not local to them. Each of the courses included in this study enrolled students who lived outside of the district served by the community college. In fact, many of the students lived outside the boundaries of the state where the college resides. This is consistent with the finding that increasing access to new audiences is a primary reason that community colleges offer CTE courses at a distance (Johnson et al., 2003). This suggests that community colleges can use online courses as a strategy to attract a critical mass of students to specific skill areas that are currently under-enrolled or to fields where there is high demand for new employees. Lifting the distance barrier of on-campus courses opens the program to a new and previously inaccessible pool of student candidates.

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APPENDIX A

COURSE SUMMARIES

Embalming II (FSE 202)
Funeral Service Education Program
Jefferson State Community College (JSCC), AL

Course Description
This course is a continuation of Embalming I (FSE 201). Specific embalming problems and procedures will be discussed. Students will be able to apply principles learned in class to embalming case analysis.

Course Competencies
- Acquire knowledge about different embalming techniques used for different post-mortem conditions
- Acquire knowledge about contagious and infectious diseases with emphasis placed upon HIV positive related illnesses and hepatitis B

Course Objectives
- Study the text and participate in lecture-discussion sessions
- Describe the location and adjoining tissues of assigned arteries and veins
- Formulate proper embalming techniques for each post-mortem condition discussed in class
- Apply class principles to on-the-job training
- Analyze post-mortem conditions in dead human remains
- Locate vessels by using anatomical guides and limits
- Criticize ineffective embalming techniques
- Explain the effects of post-mortem conditions on embalming
- Combine the theories of prudent embalming practices with equipment and supplies available at the work place

Textbooks and Readings
- Embalming: History, Theory, and Practice
- Trade Journals

Content Support
- Study guides (e.g., copies of course quizzes)

Projects
- None

Evaluation
- Student must achieve a minimum of 70% for the above stated objectives to receive a grade of C or better.

Advanced Restorative Arts/Restorative Arts II (FSE 214)
Funeral Service Education Program
Jefferson State Community College (JSCC), AL

Course Description
This course is a continuation of Restorative Arts (FSE 213). Color theory is emphasized using special cosmetics and lighting. Students will be able to demonstrate proper restorative art techniques.

Course Competencies
- Student will be able to apply the principles of modeling and feature building
- Student will learn how to correlate all phases of restorative art
- Student will learn the various methods and techniques employed in color and cosmetology

Course Objectives
- Student will be able to apply the principles of modeling and feature building
- Student will study, identify and describe the use of various cosmetic and restorative treatments
- Student will participate in lecture discussion sessions concerning modeling and color

Textbooks
- Restorative Art and Science

Projects
- Students will construct a canon with wax as it relates to surface bones and feature building
- They must be able to show satisfactory progress in building the facial bone structure and feature building and correlate all restorative treatments in constructing their canon

Tests/Quizzes/Exams
- Midterm Exam
- Final Exam

Evaluation
- Student must become proficient in the above stated objectives to the satisfaction of the instructor to receive a grade of C or better

Animal Laboratory Procedures Lab I (ATE 2658L)
Veterinary Technology Program
St. Petersburg College, FL

Course Description
This course is designed to introduce the student to the basic principles of performing a canine and feline CBC, urinalysis, and fecal examination. Normal and abnormal blood, urine and feces are examined with the emphasis on normal samples. Consistency and standardization are stressed.

Course Competencies

- Acquire knowledge about blood tests, normal blood conditions, and pathologies.
- Acquire knowledge about urine and fecal tests, normal urine and fecal conditions and pathologies.

Course Objectives

- Collect samples and prepare them for examination.
- Perform a normal canine and feline CBC, urinalysis, and fecal examination.
- Identify samples that are abnormal.

Textbooks

- Veterinary Hematology Atlas of Common Domestic Species
- Laboratory Procedures for Veterinary Technicians
- A Handbook of Routine Urinalysis

Projects/Tests/Quizzes/Exams

- 7 Projects (total) (200 points)
- 12 quizzes (200 points)
- 2 tests (200 points)
- Midterm (150 points—proctored for online)
- Final (200 points—proctored for online)

Animal Nursing and Medicine Lab I (ATE 2651L)
Veterinary Technology Program
St. Petersburg College, FL

Course Description
This course is designed to build on skills introduced earlier in the curriculum in Veterinary Clinical Practice courses. The course focuses on small animal procedures in three sections: radiology, nursing and anesthesia.

Course Competencies
- Acquire knowledge of techniques used to monitor and care for small animals in clinical settings.
- Acquire knowledge of techniques used to anesthetize a small animal patient.

Course Objectives
- Demonstrate the ability to position patients for radiologic procedures.
- Demonstrate nursing skills in monitoring and caring for small animals in a clinical setting.
- Demonstrate the ability to anesthetize a small animal patient and monitor the patient while anesthetized.

Textbooks
- Small Animal Anesthesia
- Radiography in Veterinary Technology
- Clinical Textbook for Veterinary Technicians
- Manual of Clinical Procedures in the Dog, Cat…
- ATE 2651L Student Supplement (not required for this course; all info on WebCT®)

Projects/Tests/Quizzes/Exams
- Class-time grade (80 pts)
- Homework (70 pts)
- Skills List and Picture requirement (100 pts)
- Misc. board assignments (50 pts)
- Quiz - take home after rotation 6 - (50 pts)
- Final Exam (200 pts)

Landscape Design & Planning I (AGR 211)
Landscape & Horticultural Technology Program
County College of Morris (CCM), New Jersey

Course Description
Class instruction emphasizes the theory, principles, and practices of design and planning, effective use of plant materials, artistic consideration of form and function, and basic drawing and drafting techniques. Students will learn to apply the design process as a problem solving process to produce finished designs, which can be used commercially for promoting the sale of landscape products and services.

Course Objectives
By the completion of this course students will demonstrate mastery of the following skills.

- Using pencil, scale, paper and drawing table students will correctly represent real measurements at scales from 1:2 to 1:20.
- Using 100' and 300' fiberglass tape measures, students will correctly and completely measure a full one-half acre residential site.
- Using drawing tools, students will correctly transfer field measurements to scale on paper.
- Using tape measures and field observation tools as needed, students will conduct an accurate and thorough site analysis of a residential site.
- Using Word Processing software, students will prepare a complete client needs analysis questionnaire.
- Using a prepared base plan, students will correctly add to it site analysis and client needs analysis information.
- Students will demonstrate understanding of computer applications by correctly accessing plant information databases.
- Students will use scale to properly represent the reasonable mature spread for all plants used in designs.
- Students will demonstrate knowledge of correct use of plants by preparation of residential designs meeting specific criteria as established by the instructor.
- Students will apply the Design Process to a field study in the completion of a residential design.
- Students will demonstrate understanding of the profession of landscape design and landscape architecture.
- Students will prepare an enhanced final drawing for presentation.
- Students will present their final project.

Textbooks and Readings

- Residential Landscape Architecture: Design Process for the Private Residence
- Manual of Woody Landscape Plants (optional)

Projects/Tests/Quizzes/Exams

- Quizzes
- Midterm and Final exams
- Lab projects
- Final residential design project

APPENDIX B

INSTRUMENTS

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

DEPARTMENT OF HUMAN RESOURCE EDUCATION

COLLEGE OF EDUCATION
345 EDUCATION BUILDING
1310 SOUTH SIXTH STREET
CHAMPAIGN, IL 61820

September 4, 2003

You are invited to participate in a research project on the effectiveness of a distance learning delivered course vs. a face-to-face delivered course. While your participation is voluntary, the results will help schools and teachers make better decisions and to better serve your educational needs. This project will be conducted by Dr. Scott Johnson, Dr. Angela Benson, Tod Treat, Gail Taylor, and John Duncan from the Department of Human Resource Education at the University of Illinois at Urbana-Champaign.

In addition to your normal class activities you will be asked to complete three short questionnaires related to the course. Each of these questionnaires will take less than 20 minutes of your time. With your permission, your instructor will provide us with information on learning outcomes such as course grades and copies of student projects. All information obtained will be kept confidential. Participation in this project is completely voluntary and you are free to withdraw at any time and for any reason. Your decision to participate or not will have no effect on your course grade. You will receive a copy of this consent form and a copy of the research results will be made available to you online after this project is completed.

If you have any questions about this research project, please contact us by telephone at (217) 333-0807 or by e-mail (hre@uiuc.edu). The Executive Secretary of the UIUC Institutional Review Board can answer any questions about the general rights of research subjects (417 Swanlund Bldg., 217-333-2670, E-mail: irb@uiuc.edu). Note: Students outside the 217 area code may call either of these numbers collect.

By completing the motivation survey, I am certifying that I have read and understand the above information and voluntarily agree to participate in the research project described above. I also authorize the release of my course outcome data including grades and course projects.

CLICK HERE TO BEGIN THE MOTIVATION SURVEY

telephone 217-333-0807 • *fax* 217-244-5632
e-mail hre@uiuc.edu

Motivated Strategies for Learning Questionnaire (MSLQ)

The following questions ask about your class motivation and attitude. Please answer the questions as accurately as possible by selecting one of the buttons next to each statement. Use the scale below to answer the questions: If you think the statement is very true of you, choose 7; if a statement is not at all true, choose 1. If the statement is more or less true, find the number between 1 and 7 that best describes you.

There are no right or wrong answers. Your answers will be kept confidential and will be shared only as collective summary. The survey will not be used in your course grade calculation.

Please type your name here:

1 = not at all true of me 2 3 4 5 6 7 = very true of me

1.	In a class like this, I prefer course material that really challenges me so I can learn new things.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
2.	If I study in appropriate ways, then I will be able to learn the material in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
3.	When I take a test, I think about how poorly I am doing compared with other students.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
4.	I think I will be able to use what I learn in this course in other courses.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
5.	I believe I will receive an excellent grade in this class.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
6.	I'm certain I can understand the most difficult material presented in the readings for this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
7.	Getting a good grade in this class is the most satisfying thing for me right now.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
8.	When I take a test, I think about items on other parts of the test I can't answer.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
9.	It is my own fault if I don't learn the material in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
10.	It is important for me to learn the course material in this class.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
11.	The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7

12.	I'm confident I can learn the basic concepts taught in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
13.	If I can, I want to get better grades in this class than most of the other students.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
14.	When I take tests, I think of the consequences of failing.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
15.	I'm confident I can understand the most complex material presented by the instructor in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
16.	In a class like this, I prefer course material that arouses my curiosity, even if it is more difficult to learn.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
17.	I am very interested in the content area of this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
18.	If I try hard enough, then I will understand the course material.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
19.	I have an uneasy upset feeling when I take an exam.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
20.	I'm confident I can do an excellent job on the assignments and tests in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
21.	I expect to do well in this class.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
22.	The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
23.	I think the course material in this class is useful for me to learn.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
24.	When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
25.	If I don't understand the course material, it is because I didn't try hard enough.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7

26.	I like the subject matter in this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
27.	Understanding the subject matter of this course is very important to me.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
28.	I feel my heart beating fast when I take an exam.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
29.	I'm certain I can master the skills being taught in this class.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
30.	I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
31.	Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7

Please fill the blank:

32. How many hours per week do you work at a paid job in the landscape and horticulture industry? _____

33. How many hours per week do you work at a job outside the landscape and horticulture industry? _____

34. How many years have you worked at jobs in the landscape and horticulture industry? _____

35. How many credit hours are you taking this semester? _____

Thank you for completing the Motivated Strategies for Learning Questionnaire (MSLQ). If you would like additional information about the study, please contact your instructor.

Before you click the "Submit" button be sure that your name was entered at the beginning of the survey.

Submit | Clear and start over

Professors Pintrich, Smith, Garcia, and McKeachie at the University of Michigan developed the MSLQ . If you are interested in using the MSLQ, please write them at the University of Michigan, 610 E. University Avenue, Room 1323, Ann Arbor Michigan, 48109-1259.

Course Assessment Questionnaire

Your college is participating in a study of postsecondary career and technical education (CTE). As a part of this study, we would like your feedback to assess the strengths and weaknesses of this course. This questionnaire is designed to collect data on issues related to your experience in this course. Participation is voluntary and does not in any way affect your grade in this course. Information provided to us will be kept confidential. Thank you for your participation.

Please type your name here for your instructor's records:

Background Information

Gender: Male Female

Ethnic Background: [ ]

Course & Instructor Ratings	**Exceptionally Low**	**Low**	**Average**	**High**	**Exceptionally High**
Rate the instructor's overall teaching effectiveness	❍	❍	❍	❍	❍
Rate the overall quality of this course	❍	❍	❍	❍	❍

The following statements relate to your perceptions of your learning experience. For each statement, please indicate the extent to which you agree with these experiences by selecting one of the buttons next to each statement. We are interested in your opinion that best describes perceptions of your learning experience.

#	Item	Strongly Disagree	Disagree	Agree	Strongly Agree
1.	I was able to share learning experiences with other students in this course.	❍	❍	❍	❍
2.	The instructor helped me identify my problem areas in this course.	❍	❍	❍	❍
3.	The organization of the course content made learning easier.	❍	❍	❍	❍
4.	I was able to interact with the instructor.	❍	❍	❍	❍
5.	The instructor followed the course syllabus.	❍	❍	❍	❍
6.	Increased contact with other students helped me get more out of this course.	❍	❍	❍	❍
7.	I was able to communicate with other students in this course.	❍	❍	❍	❍
8.	The instructor did NOT provide positive feedback in this course.	❍	❍	❍	❍
9.	The instructor provided me with feedback about my progress periodically during this course.	❍	❍	❍	❍
10.	A sense of community existed among students in this course.	❍	❍	❍	❍
11.	The instructor encouraged me to work together with other students in small groups/teams.	❍	❍	❍	❍
12.	The instructor did NOT use a variety of teaching methods in this course.	❍	❍	❍	❍

13.	The course was taught in a way that matched my preferred way of learning.	❍	❍	❍	❍
14.	The instructor provided feedback to me that was useful.	❍	❍	❍	❍
15.	The instructor gave tests and assignments that were based on what I learned in the course.	❍	❍	❍	❍
16.	I was NOT able to interact with the instructor when I needed to.	❍	❍	❍	❍
17.	I was allowed to work at my own pace in this course.	❍	❍	❍	❍
18.	The instructor encouraged me to become actively involved in class discussions.	❍	❍	❍	❍
19.	The structure of class activities allowed me to actively participate in the class.	❍	❍	❍	❍
20.	I was NOT allowed to select what I wanted to learn in this course.	❍	❍	❍	❍
21.	The instructor provided comprehensive feedback on my course assignments.	❍	❍	❍	❍
22.	The instructor treated me with respect.	❍	❍	❍	❍
23.	The instructor used real world examples in this course.	❍	❍	❍	❍

#	**Item**	Not Close	Close	Very Close	Indifferent
1.	How close do you feel to your instructor?	❍	❍	❍	❍
2.	How close do you feel to your program of study?	❍	❍	❍	❍
3.	How close do you feel to your college?	❍	❍	❍	❍

Use the scale below to answer the questions: If you think the statement is very true of you, choose 7; if a statement is not at all true, choose 1. If the statement is more or less true, find the number between 1 and 7 that best describes you. There are no right or wrong answers.

1 = not at all true of me 2 3 4 5 6 7 = very true of me

#	**Item**	**Answers**
1.	I usually study in a place where I can concentrate on my course work.	❍ ❍ ❍ ❍ ❍ ❍ ❍ 1 2 3 4 5 6 7
2.	I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.	❍ ❍ ❍ ❍ ❍ ❍ ❍ 1 2 3 4 5 6 7
3.	I make good use of my study time for this course.	❍ ❍ ❍ ❍ ❍ ❍ ❍ 1 2 3 4 5 6 7
4.	I work hard to do well in this class even if I don't like what we are doing.	❍ ❍ ❍ ❍ ❍ ❍ ❍ 1 2 3 4 5 6 7

5. I find it hard to stick to a study schedule.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
6. When course work is difficult, I either give up or only study the easy parts.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
7. I have a regular place set aside for studying.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
8. I make sure that I keep up with the weekly readings and assignments for this course.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
9. I attend this class regularly.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
10. Even when course materials are uninteresting, I manage to keep working until I finish.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
11. I often find that I don't spend very much time on this course because of other activities.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7
12. I rarely find time to review my notes or readings before an exam.	❍ 1	❍ 2	❍ 3	❍ 4	❍ 5	❍ 6	❍ 7

What were the major strengths of this course?

What were the major weaknesses of this course?

What suggestions do you have to improve this course?

Thank you for completing the questionnaire.
If you would like additional information about the study, please contact your instructor.
Thanks again!

Submit | Clear and start over

Professors Pintrich, Smith, Garcia, and McKeachie at the University of Michigan developed the MSLQ . If you are interested in using the MSLQ, please write them at the University of Michigan, 610 E. University Avenue, Room 1323, Ann Arbor Michigan, 48109-1259.