Distance Learning in Postsecondary Career and Technical Education

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DISTANCE LEARNING IN POSTSECONDARY CAREER AND TECHNICAL EDUCATION

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Distance Learning Defined

Distance education is defined, for the purposes of accreditation review, as "a formal educational process in which the majority of the instruction occurs when student and instructor are not in the same place. Instruction may be synchronous or asynchronous. Distance education may employ correspondence study, or audio, video, or computer technologies" (North Central Association Commission on Institutions of Higher Education, 2003). Communication between students and the instructor is supported using one or more methods or technologies that typically include one- or two-way text, graphics, program sharing, video, audio, or the Internet, as well as the more traditional mail, fax, and telephone communications.

Distance education, or distance learning, in higher education has a history dating from the late 1800s. At that time, students had limited access to higher education institutions because of the geographic distance between educational institutions and rural populations (Banas & Emory, 1998). Educators bridged this gap by delivering instruction via correspondence courses (e.g., printed educational materials sent through the mail to students at off-campus locations). Illinois State University has been credited as the initiator of distance learning at the university level, starting in 1874 (Danesh, Mandviwalla, & Liu, 2000). In 1883, the state of New York authorized Chautauqua College of Liberal Arts to grant academic degrees to students who successfully completed coursework at the summer institutes and during the academic school year via correspondence. This trend soon spread to other universities.

Distance learning had its beginnings in the "factory model" of behaviorist teaching, and used a form of programmed instruction to deliver education at a distance through correspondence courses. Although print-based correspondence courses have been the traditional method of distance learning, a more contemporary perspective relies on various forms of computer technologies to deliver instructional materials to students via text, graphics, animations, and audio and/or video recordings. Schools can now make use of the Internet to create a virtual classroom environment where instructors can deliver instruction to students, and students can connect with each other and the instructor.

Technology-supported distance learning has been expanding steadily since the early 1970s (Synergy Plus, 2002). The advent of the World Wide Web, introduction of commercial Web browsers, availability of inexpensive personal computers, and a growing demand for flexible learning all contributed to its expansion in the mid-1990s. A variety of labels are used to describe this new form of distance learning, the most common of which are online learning, Web-based instruction, and e-learning. Whatever labels are used for educational programs delivered using the Internet, they share a common characteristic: courses are accessible 24 hours a day, 7 days a week (24/7) from most any location in the world. By virtue of the convenience of this instructional delivery format, students who participate in quality online educational programs are able to learn at their own pace. In other words, learning can occur any time, any place, and any pace.

Growth of Distance Learning

> We need to foster a flexible education system—one that integrates work and training, and that serves the needs both of experienced workers at different stages in their careers and of students embarking on their initial course of study. Community colleges, for example, have become important providers of job skills training not just for students who may eventually move on to a 4-year college or university, but for individuals with jobs—particularly older workers seeking to retool or retrain. The increasing availability of courses that can be 'taken at a distance' over the Internet means that learning can more easily occur outside the workplace or the classroom. (Greenspan, 2000, pp. 4–5)

Distance learning programs have seen dramatic growth in the last decade. Current statistics highlight the 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 (National Center for Education Statistics [NCES], 2000a). During this same time, the number of courses rose from 25,730 to 54,470, and student enrollments rose from about 760,000 to about 1.66 million (Wonacott, 2001). In just one year, between 1997 and 1998, the growth of distance learning programs in higher education was well over 70% (NCES, 2000a). Future projections suggest that this incredible increase will continue because of the demand for online or Web-based instruction. In 1995, the most common information and communication technologies used for the delivery of distance instruction were two-way interactive video and one-way prerecorded video. By 1998, the use of Web-based courses surpassed the use of these technologies.

Growth of distance learning is also evident in the area of career and technical education (CTE), although comprehensive nationwide statistics are not available (Wonacott, 2001). Historically, distance learning has not focused on vocational or technical education primarily due to the academic and funding priorities in the 1970s and 1980s. Using Internet and computer technologies and multimedia resources, community colleges have expanded their distance learning programs to include career and technical courses. Reese (2002) found that "the number of [distance learning] career and technical education programs today may still be small, but that number is increasing—a trend that should benefit both the students and the workplace of tomorrow" (p. 24).

Another facet of this growth relates to faculty and institutional involvement. Currently, 1 in 10 higher education members of the National Education Association (NEA) offers a distance learning course, and 90% of NEA members who teach traditional courses reported that distance learning courses are offered or being considered at their institutions (NEA, 2000). The recent growth of distance learning programs is also due to several other interrelated factors: (a) the changing demographics of college students, (b) the increasing popularity of distance learning, and (c) the personal appeal of this innovative learning environment to some learners.

Student Demographics

The changing demographics of college students support the need for a flexible postsecondary educational delivery system. College students, who used to be primarily 18–23 years old, single, and full-time residential students are now more likely to be older, married, employed full-time,

and commuters to campus to attend class. In 1999–2000, 43% of all undergraduates were age 24 or older, 27% had dependents, 13% were single parents, and 80% were employed, including 39% who were employed full-time (NCES, 2002a). In 1999, one third of all college students were enrolled part-time (U.S. Census Bureau, 1999).

The NCES (2002b) also reports that students who are independent, older, married, or have dependents participate in distance learning at greater levels than their peers who do not fit this profile. Students who are trying to balance school with work and home responsibilities appreciate the flexibility of time, location, and programs offered through education via the Web (Brown, 2000). This flexibility allows them to pursue their educations while continuing in their current jobs and responsibilities (Wambach, Boyle, & Hagemaster, 1999). These students are attracted to educational opportunities that allow them to remain employed and connected to their families while still pursuing a college certificate or degree.

Traditionally, students were restricted to "locally available" courses and programs, and had to fit their needs to whatever programs were offered. Distance learning makes available a much broader palette of options. Students are now free to shop in a global marketplace for the educational opportunities that best suit their needs (Association for Career and Technical Education, 2003). When related to distance learning, the term "delivery system" might easily be replaced with the concept of "student-initiated access" (Carr-Chellman & Duchastel, 2001).

The number of students interested in distance learning is growing dramatically. These students see education as a supplement to support family and career goals, rather than a personal goal—making distance learning a reasonable option. The number of students enrolled in distance education as a percentage of total postsecondary enrollments is projected to triple to almost 15% in 2002 from just 5% in 1998 (Web-based Education Commission, 2000).

Technological Advancements

The popularity of distance education has grown along with the Internet and the improvement of technologies that support online learning environments. One of the consequences of this tremendous surge in online technology development and use has been the parallel growth of technology-mediated distance learning at the higher education level (Phipps & Merisotis, 2000). At the community college level, much of the growth in distance learning has been accomplished through the development and delivery of telecourses, with enrollment growth from 55,000 in 1981 to over 500,000 in 2001 (Synergy Plus, 2002). More recently, the growth in distance education has occurred through the use of Web-based technologies. For example, among all higher education institutions offering any distance education, the use of two-way interactive video and one-way prerecorded video were essentially the same in 1997–98 as in 1995, while the use of asynchronous Web-based technologies nearly tripled in that same time period (NCES, 2000a).

Such a change is not new to the distance education community, which has seen technology-based educational innovations come and go with much fanfare. Educators were skeptical of the educational potential of the printing press, the typewriter, the telephone, the television and the computer. Each of these technologies required enormous capital investments and, according to some critics, did little to enhance knowledge (Smith, 2002). The development of instructional

films in the early 1900s 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. 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.

The increasing portability and mobility provided by wireless communications technologies will likely contribute to the growth of 24/7 learning in years to come. Existing technologies allow users to browse the Internet, receive e-mail, and send and receive updates and text messaging. These same technologies, when coupled with enhanced mainframe computing as a central storage unit, have the potential to break through economic, cultural, and political barriers to distance learning (Hayden, Rientjes, Ryder, & Wall, 2001).

Internet-Literate Learners

A third reason for the growth of distance learning programs is that Internet-literate learners gravitate to distance learning because they are simply attracted to this innovative learning environment (Synergy Plus, 2002). Distance learning represents not merely an acceptable replacement, but rather a desirable alternative, to on-campus instruction (Thompson, 1998). Right behind today's higher education distance learner, is a new generation of learners who are currently students in grades K–12. These learners are using Internet technologies at school, as well as at home and at other public venues, on a regular basis for information and entertainment reasons. It is speculated that this evolving Internet-literate generation will be much more receptive to distance learning.

Concerns about Distance Learning

Although various forms of distance learning have existed for decades, the rapid growth of Web-based instructional programs has created a need to examine this new instructional innovation carefully. As with any innovation that gains rapid acceptance and use, careful study of the growth patterns and effective practices is needed.

One of the first questions asked by faculty before making the decision to deliver courses at a distance is, "Can a quality education be provided at a distance?" The educational research community shares a general acceptance that "distance education is just as effective as traditional education with regard to learners' outcomes" (NCES, 2000a, p. 6). Numerous studies that compared traditional classroom-based instruction with technology-supported distance learning have found no significant differences in learning outcomes or student satisfaction (Blackley & Curran-Smith, 1998; Clarke, 1999; Johnson, Aragon, Shaik, & Palma-Rivas, 2000; Navarro & Shoemaker, 1999; Ryan, 2000; Smeaton & Keogh, 1999). This conclusion is further supported by Russell's (1999) compilation of more than 300 research reports, summaries, and papers on the effectiveness of technology-mediated distance learning. While the findings of these studies are criticized for being narrowly focused and anecdotal in nature, they consistently show that instructional technology does not diminish learning outcomes when compared to traditional delivery methods—suggesting that it is the quality of the design of a course, and not the delivery format, that is important.

The use of technology in education provides an environment where new technologies and methods of communication allow for innovative teaching and learning practices that may not be possible in traditional, place-bound education (McDonald, 2002). However, since content and substance can be delivered in more than one venue, the key to good instruction is design and control of content by skilled faculty (Lujan, 2002). Well-designed courses, regardless of their delivery environments, provide educationally sound links between learning outcomes, teaching methods, and the assessment of student learning (Newble & Cannon, 2001). A recent study, commissioned by the U.S. Department of Education, states that, "With the exception of certain laboratory or 'hands-on' experiences, in which actual manipulation of equipment, tools, and instruments, or personal contact is an absolute necessity, especially to validate manipulation skills, instructional content normally covered in traditional classroom-based methods can be done effectively using distance learning" (Synergy Plus, 2002, p. 15).

Numerous national studies have been conducted in recent years that address issues of use, instructional quality, and effectiveness. For example, recent studies conducted by NCES provide information regarding the growth of distance learning in post-secondary institutions, the types of courses and programs being offered, the technologies being used, and the costs associated with distance learning programs (NCES, 2003; NCES, 2000a). Another study, commissioned by the Institute for Higher Education Policy (2000), used case studies of Web-based degree programs in colleges and universities to create a list of "benchmarks for success" that are essential for ensuring quality in distance learning. Still another example of a national assessment of technology use in higher education is the Campus Computing Project's annual survey (Green, 2000). While these studies provide suggestions for effective practice in postsecondary distance learning programs, they fail to address specifically the delivery of postsecondary *career and technical education* distance learning courses.

Distance Learning in Postsecondary Career and Technical Education

Career and technical education (CTE) means many things to many people. To some people, it refers to a single course that provides specific skill training for job employment or advancement, while to others, it refers to a lifelong learning pathway that is used to obtain, update, and extend the knowledge, skills, and attitudes required to pursue a career successfully. Career and technical education imparts both specific occupational skills to those students wishing to enter employment directly and the academic skills they need for the world of work and for further post-secondary education (NCES, 2000b). Today's postsecondary CTE student has access to a wide range of programs in areas such as plumbing, carpentry, auto mechanics, drafting, computer-aided design, respiratory therapy, and mortuary science.

While CTE continues to be offered at the high school level, a more significant role is now being played by community colleges, technical institutes, and private, for-profit organizations. According to the Association for Career and Technical Education (ACTE):

> Career and Technical Education is about helping students, workers and lifelong learners of all ages fulfill their working potential. First and foremost it's about high school and college education that provides students with:

- Academic subject matter taught with relevance to the real world, often called contextual learning.
- Employability skills, from job-related skills to workplace ethics.
- Education pathways that help students explore interests and careers in the process of progressing through school.

But career and technical education is also about:

- Second-chance education and training for the unemployed and those seeking to upgrade their employability skills.
- Education to earn additional degrees, especially when related to career advancement.
- Corporate training, continuing education, skills upgrades and refresher courses for those already in the workplace. (ACTE, 2003, p. 1)

The Role of Community Colleges in Career and Technical Education

The nature of workforce development is changing substantially. A recent whitepaper from the Illinois Board of Higher Education (IBHE) outlines these changes. In particular, the whitepaper outlines changes in occupational structure as a movement from "an era in which most jobs were in routine, low-skill, assembly and equipment operator occupations, to one in which most jobs—and the fastest growing types of jobs—were in creative and knowledge-intensive professional, technical, and management-related fields" (IBHE, 2002, p. 47). In order to meet these workforce needs, CTE must be responsive, serve multiple sectors and markets, and, increasingly, be transferable towards attainment of a bachelor's degree (Jacobs, 2001).

Community colleges have played a key role in connecting high school tech prep, industry training, and baccalaureate education.[1] As an institution of higher education, known for its adaptability and willingness to provide customized training, the community college has been influenced by industry (Dougherty & Bakia, 1999; Grubb, 1996) and through federal policy, such as the Workforce Investment Act (WIA) and the Carl D. Perkins Vocational and Technical Education Act. Federal policy has generally acted to increase the workforce preparation role played by the community college. In fact, community colleges are the designated short-term training provider in many states (Villadsen & Gennett, 1997).

The last decade of the 20th century was marked with discussions of "new vocationalism,"—a response to "A Nation at Risk" (National Commission on Excellence in Education, 1983), which called for programs that do not focus solely on narrow job training, but on a broader curriculum that bridges academic and vocational aims by including problem solving and other skills. The new vocationalism, addressed through an integration of academic and occupation programs,

[1] For the sake of brevity, the term "community college" will be used generically to include not only community colleges, but also technical institutes and junior colleges.

"reinforces the shifting paradigm from teaching to learning and requires that students become active participants in the construction of their own knowledge" (Brewer, 1999, p. 1).

As high schools focus increasingly on college preparation, community college CTE has taken on a more critical role in workforce preparation. High school vocational programs had strong growing enrollments until the mid-1980s. For example, in 1982, 22% of the courses taken by the "average" high school student were in the vocational area, but that number had fallen to 16% by 1994 (Levesque, Lauen, Teitelbaum, Alt, Librera, & Nelson, 2000). The reasons for this decline have been identified as (a) failure to meet employer or community needs, (b) a perception that vocational education had been "dumbed-down," (c) parents' concerns that vocational education is not appropriate for a college-bound student, and (d) the view that vocational education inhibits, rather than enables, future career and education goals (Lynch, 2000). These trends occurred at the same time the economy began changing to a knowledge-based system.

The increased role of postsecondary CTE is quite complex. First, the curriculum must meet both the employment expectations of students seeking entry-level jobs and the more tightly defined needs of working professionals who desire upgraded skills for job advancement. Second, the nature of career preparation itself is changing to a broader, more holistic skill set with greater emphasis on credentials and job skills rather than degrees (Lynch, 2000).

The Role of Community Colleges in Providing Career and Technical Education at a Distance

While the number of nontraditional CTE programs offered through distance learning may still be small, "that number is increasing—a trend that should benefit both the students and the workplace of tomorrow" (Reese, 2002, p. 24). Lever-Duffy, Lemke, and Johnson (1996) compiled examples of model community college distance learning programs and concluded that distance education, while "once a fringe methodology, is fast becoming a fundamental methodology for the Information Age institution" (p. vii). In a 3-year trend study of the 700 member colleges of the League for Innovation in the Community College, Milliron and Miles (2000) identified expected trends for instructional technologies and distance learning in community colleges. All of the participating schools agreed that the trend towards the use of information technology in instruction would increase over the next 3 to 5 years, and fewer than 15% expected that the trend towards distance learning would decrease. According to the *Campus Computing Survey*, 74% of community colleges now offer online courses to students (Green, 2000). A recent study by the Florida State Board of Community Colleges (2000) gathered data about the use of distance courses—specifically those offered through two-way interactive video and the Internet. The overall goal of the study was to determine how students appreciate the access and convenience of distance learning courses and their willingness to adapt to the technology. Five hundred and fifty-five students, representing 18 Florida community colleges, who were enrolled in 113 different distance courses, responded to an online survey. The respondents were asked their reasons for enrolling in online distance learning courses. Forty-seven percent of the respondents indicated they would not have been able to take the course if it had not been offered via distance learning. Eighty-seven percent also indicated that convenience in accommodating work, family, or competing demands was a reason for taking the course.

One outcome of a recent needs sensing activity conducted by the National Dissemination Center for Career and Technical Education was the degree of importance assigned to technology and distance education by practitioners in the field (Lewis, 2001). This project used conference calls and online technology to solicit feedback from teacher educators, state-level secondary education representatives, and tribal/racial/ethnic networks regarding the critical issues facing CTE. Listed among the most highly rated needs for the field was the growing importance of technology and distance learning. Most of the comments provided by the participants highlighted the need to prepare instructors to use technology to enhance instruction in the classroom and through distance education.

Statement of the Problem

In spite of the rapid growth in distance learning, due primarily to the popularity of Web-based instruction, there is limited understanding of the scope and impact of distance learning on postsecondary CTE. The primary purpose of this study was to determine the current status and future trends associated with distance learning in postsecondary CTE. To accomplish this purpose, a national study was conducted to answer the following research questions:

1. How prominent is distance education in postsecondary CTE?
2. What are the institutional drivers and desired outcomes of distance education in postsecondary CTE?
3. Which institutions and students participate in postsecondary CTE distance courses and programs?
4. What types of technologies are used to deliver postsecondary CTE distance courses?

METHOD

This study involved a descriptive analysis of the status of distance learning in postsecondary CTE programs. A nationally representative sample of community colleges was asked to participate in the research to answer questions addressing the prevalence of distance learning in postsecondary CTE.

Participants

Target Population

The target population for this study was defined as postsecondary colleges and technical institutes that are members of the American Association of Community Colleges (AACC). These institutions are typically referred to as community colleges, technical institutes, or junior colleges. The population provided a national representation of institutions, and included all types, sizes, geographic locations, and settings (i.e., urban, suburban or large town, rural). The population included institutions that were classified as single-campus colleges, variations of multi-campus colleges (i.e., district offices, multi-college districts, or institutional systems), and colleges that were on the campus of a university and had either a separate or shared accreditation with their host institution. The sampling frame for the population was obtained from AACC, and contained a list of 1,019 member institutions. After removing duplicate references in the database, the final target population contained 1,015 member institutions.

Sample Selection

Based on discussions with AACC researchers, it was determined that their membership, in terms of institutional characteristics, was heterogeneous across states and homogenous within states. Therefore, a proportionally representative sample was obtained using a stratified random sampling technique. Using each state in the nation as a stratum ensured a representative sample at the state level. A total of 552 member institutions were randomly selected from the AACC membership database. The number of institutions randomly sampled from each state was proportional to the number of community colleges in that state. This helped to further ensure that a nationally representative sample was obtained.

Instrumentation

The development of the questionnaire for this study involved working closely with contacts at several professional associations to gain insight into related studies they have completed, to seek their advice on increasing response rates, and to identify the critical questions that needed to be included in the questionnaire. Based on this interaction, the research was formally endorsed by AACC, the League for Innovation in the Community College, the National Council for Workforce Education (NCWE), the National Council for Continuing Education and Training (NCCET), and the Instructional Technology Council (ITC). A statement highlighting the endorsement of these associations and the logo of each association was incorporated into the questionnaire.

In addition to involving these professional associations in the development and validation of the questionnaire, the instrument was pilot-tested with a group of community college leaders

whose institutions were not included in the national sample. The purpose of this pilot test was to reduce non-sampling errors by pretesting the instrument with respondents at institutions similar to those in the sample. The representatives from these institutions were asked to complete the questionnaire and provide suggestions for changes in item content, wording, organization, and format.

The questionnaire consisted of 14 items addressing multiple dimensions of distance learning programs, courses, and technologies. The estimated amount of time needed to complete the questionnaire was 1–2 hours, as several items required respondents to spend up to an hour collecting the needed data. The anticipated length of the questionnaire and projections of respondent burden were determined based on estimates used by NCES in their national study of postsecondary institutions (NCES, 2002b).

The questionnaire employed the definition of distance learning used by the NCES in their studies of distance education in postsecondary education institutions (NCES, 2003; NCES, 2000a). This definition highlights education or training courses that are delivered to off-campus location(s) via audio, video (live or prerecorded), or computer technologies, including both synchronous and asynchronous delivery modes of instruction. As with the NCES surveys, courses offered exclusively on-campus, those offered via written correspondence, and those where the instructor travels to a remote site to deliver instruction in person were not included in this definition of distance courses.

The questions on the questionnaire were organized around the following four categories:

1. *Distance Learning Courses, Programs, and Enrollments in Career and Technical Education (Items 1–5, 9, 11):* These items sought up-to-date information about CTE programs and course enrollments. Respondents were asked to list the number of programs, courses, and student enrollments in on-site and distance learning credit and certificate CTE programs, and to report enrollment trends in distance learning CTE. Item 9 sought to identify trends in enrollment as a function of student demographics. Item 11 aimed to gain descriptive statistics of online or Web-based courses, as opposed to distance learning courses in general. In this study, credit courses were defined as those that may be applied toward a degree at a community college or 4-year institution, while noncredit courses are those courses that cannot be applied toward a degree. Noncredit courses are typically offered through a community college's continuing education division. Degree programs award academic degrees (e.g., Funeral Service A.A.S.) and are comprised of general education courses and courses specific to the occupation. Certificate programs provide training for specialized occupations (e.g., Certified Addictions Specialist or C++ Programmer) and award a certificate upon completion. Certificate programs can be comprised of either credit or noncredit courses. Licensure/credentialing programs provide training for specialized occupations and prepare enrollees to take occupation-specific licensure/credentialing examinations. These programs are typically comprised of noncredit courses.

2. *Exemplary Career and Technical Education Distance Learning Courses (Item 6):* This item asked the respondents to identify an exemplary CTE distance learning course at the institution. This information was obtained to allow for follow-up of exemplary online courses in CTE.

3. *Learning Goals in Career and Technical Education Distance Learning Courses (Item 7):* This item addressed the skill- and knowledge-based outcomes of CTE distance learning courses.

4. *Technology Use in Career and Technical Education Distance Learning Courses (Items 9, 10, 12, 13):* These items addressed technology use in CTE distance learning courses. The items were designed to describe the technologies and outcomes of CTE distance learning courses, including future trends.

5. *Reasons for Offering Career and Technical Education Distance Learning Courses (Items 8, 14):* These items addressed institutional reasons for offering or not offering CTE distance learning courses. These reasons were used to establish opportunities and barriers to CTE distance learning programs.

Data Collection Procedures

This study involved mailing a questionnaire to the executive officers of each of the postsecondary institutions identified in the sample. The AACC provided a list containing the mailing address for the executive officer of each institution in the sample. The documentation required to gain human subject approval for this research was submitted to the University of Illinois Institutional Review Board (IRB), and formal approval to engage human subjects in this research was granted.

Data Gathering Process

A four-round data collection process was used to obtain responses to the survey. The wording of one item in the questionnaire was changed so that the response rates for each round could be determined. In round one (the initial mailing), a questionnaire was sent to the executive officers of the 552 institutions in the sample. Round two involved a second mailing to executive officers at those institutions that had not responded to the round one solicitation. Round three involved making telephone calls to executive officers at those institutions that had not responded to the first two solicitations. In this round, attempts were also made to identify and contact the individuals who had direct control over distance learning at the institution. Round four utilized Web-based institutional information to identify specific administrators who oversee distance learning and to verify mailing and e-mail addresses. These individuals were then contacted by phone and e-mail. The multiple rounds of data collection were designed to increase the response rate. They also allowed for a comparison of the responses from early and late respondents. Each of the data collection rounds is described in greater detail below.

Round 1: Direct Mailing. The questionnaire was mailed to the executive officer at each of the institutions in the sample. The mailing contained a cover letter that described the study, the four-page questionnaire, and a self-addressed stamped return envelope. The executive officers were asked to forward the questionnaire to the person(s) at their institution most knowledgeable

about distance learning program administration and/or directly involved in providing CTE courses at their institution.

Round 2: Direct Mailing. The second phase of the data collection process involved a second mailing to the executive officers of each institution that had not yet responded to the first solicitation. The non-respondents received a package containing the same materials as the first mailing, with the exception of a cover letter that indicated that this was a second request. The wording of item 9 of the questionnaire was modified slightly to allow tracking of the returned questionnaires.

Round 3: Direct Telephone Calls. Telephone calls were made to all institutions that had not responded to the first two solicitations. The telephone numbers for each institution were included on the mailing list database that was provided by AACC. The process of making the telephone calls was complicated by the fact that, for some institutions, the AACC sampling frame did not have a telephone number (n = 19), or an incorrect telephone number was listed (n = 21). In addition, several of the institutions in the sample had automated telephone-answering systems that would place the caller in an endless loop.

When contact was made at an institution, the purpose of the study was described to the executive officer or their administrative assistant, and they were then asked who might have received the forwarded questionnaire. Contact information for that individual was then requested (i.e., telephone number or e-mail address) and attempts were made to contact that person directly.

When no contact could be made with a person at an institution, a voicemail message that described the study was left for the executive officer. When contact was made with the appropriate person at an institution, the purpose of the study was described and an offer made to send them a copy of the questionnaire via mail, fax, or e-mail. In most cases, the individual expressed an interest in the study and offered to complete the questionnaire. In other cases, the individual stated they were not allowed to participate in unsolicited surveys, did not have time to participate, or simply elected to "opt out" of the study—all of which were appropriate options according to the IRB guidelines for involving human subjects in survey research of this type.

Round 4: Direct Telephone Calls and Targeted Mailing. During the fourth round, institutions' Web sites were used to identify administrators of distance education at those institutions that had not responded to the previous solicitations. These individuals were contacted at the phone numbers listed on the Web site. If available to take the call, they received a solicitation to participate in the study, and a copy of the questionnaire was e-mailed to them. For those individuals who were not available to take the call (e.g., in meetings, teaching courses, absent for weather-related school closings), paper copies of the questionnaire were mailed to them.

Response Rates

The procedure used for response rate calculation was based on the guidelines established by the Council of American Survey Research Organizations (CASRO) and used by the American

Association for Public Opinion Research (2000). The final response rate for the study was obtained using the CASRO RR_2 formula that counts partial questionnaires as respondents:

$$RR_2 = \frac{(I + P)}{(I + P) + (R + NC) + U}$$

Key: I = Completed Questionnaires (270)
P = Partial Questionnaires (3)
R = Refusals to Participate (17)
NC = Non-Contacts (222)
U = Unknown (0)

Forty entries were removed from the originally selected sample because of incomplete contact information, leaving an accessible sample of 512. Using the CASRO RR_2 formula, a final response rate of 53.3% was achieved. The response rate on this survey compared quite favorably with a study conducted by AACC. AACC sent their questionnaire to chief academic officers at more than 1,100 community colleges, and 205 colleges responded, for a 19% response rate (Nock & Shults, 2001).

Strategies to increase response rates. Several strategies were used to increase the response rate (Brennan, 1992; Forsgren, 1989). First, prior to the distribution of the questionnaires, community college and career and technical organizations were contacted for sponsorship to gain support for the project. The names of these organizations and their graphic logos were included on both the cover letter and the first page of the questionnaire.

Second, each cover letter was personalized to include the title and name of an executive officer in the mailing address and salutation. Personalization of mailed questionnaires has been shown to improve response rates (Brennan, 1992). Third, a $50 gift certificate from Borders Bookstore was offered to those respondents who returned useable questionnaires. Fourth, the multiple rounds of follow-ups were conducted with non-respondents.

Representativeness of the respondents to the non-responding population. An important consideration in survey research is the degree to which the survey respondents are representative of the target population. Ensuring that the respondents are representative of the population allows for generalizability of the results. A basic assumption about response rates is that probability sampling such as that used in this study, coupled with a high response rate, will provide a sample that is a near perfect representation of the population. However, it is not necessarily true that a representative sample increases as the response rate increases. As shown by Visser, Krosnick, Marquette, and Curtin (1996), surveys with a very low response rate can provide more accurate information than surveys with a much higher response rate. Two issues are important here. First, the more researchers work to increase response rates, the less representative the sample becomes (Krosnick, 1999). Second, it has been shown that the substantive findings from survey research change little as response rates improve (Traugott, Groves, & Lepkowski, 1987). As stated by Krosnick, "when probability sampling methods are used, it is no longer sensible to presume that lower response rates necessarily signal lower representativeness" (1999, ¶ 12).

In this study, with a response rate of 53.3%, the respondent pool has a strong resemblance to the larger population. Two hundred and seventy community colleges completed the questionnaire. Table 1 shows the distribution of those respondents by region (East, 42.2%; Midwest, 30.0%; West, 27.8%), locale (urban, 34.8%; suburban or large town, 30.4%; rural, 35.2%), and enrollment (1,000 or fewer students, 8.5%; 1,001–3000, 33.4%; 3,001–10,000, 42.2%; more than 10,000, 15.9%). The table also shows that the distribution of 270 responding institutions by region, locale, and enrollment is comparable to the distributions for the entire sample of 512 community colleges and the full population of 1,015 community colleges.

To verify the representativeness of the respondents to the population, several statistical comparisons were performed. The demographic characteristics of the respondents who provided useable data were compared to characteristics of the non-respondents within the sample. These comparisons included comparing the respondents to the non-respondents in terms of their institution's U.S. geographic region (e.g., New England, Great Lakes, Southwest), local setting (i.e., urban, suburban and large town, rural), campus type (e.g., single campus or multiple campus), and institutional size (i.e., total enrollment).

Comparisons for geographic region, local setting, campus type, and institution size involved running Crosstabs in version 11 of the *Statistical Package for the Social Sciences* (SPSS) and calculating Pearson's Chi-Square. No differences were found between the respondents and non-respondents within the sample for all demographic indicator comparisons (see Table 2). The comparison between the respondents and the target population also revealed no statistical differences between those two groups on the demographic indicators (see Table 3). Comparisons were also made to determine if the non-respondents were different from the target population in general. As shown in Table 4, there were no differences between the non-respondents within the sample and the target population.

It must also be determined if the respondents differ in some way. One common method to address this concern is to compare those who responded quickly to those who responded only after several attempts were made to solicit their responses. The comparison of the early and late respondents, as shown in Table 5, revealed no significant differences between the demographic characteristics of the two groups.

These comparisons provide a thorough analysis of the degree to which the respondents and non-respondents are similar to the target population. Because no apparent differences were found between the groups, one may conclude that the respondents are representative of the non-respondents within the sample and the target population in general. Because conservative estimates of sample size were used in the calculation of the desired usable response, the useable responses represent 26.6% of the target population, which further enhances the generalizability of the findings.

Data Coding Procedures

The data coding procedures involved entering the data into a Microsoft Excel spreadsheet in its raw state, converting the data within the spreadsheet into usable form (i.e., converting nonnumeric data into numeric form), verifying the accuracy of the data entry, and then importing the data into SPSS for analysis. All data from the returned questionnaires were entered initially into a Microsoft Excel spreadsheet that also contained institutional demographic data provided by AACC. Fixed choice items on the questionnaire were converted to a numerical code for entry. For example, checkboxes were converted to 1 if checked, and 0 if not checked.

Initial analysis of the survey responses revealed uneven response rates for particular questions. In order to increase the response rates, clarification was pursued for questions that were left blank, contained "N/A," or had anomalous numbers (for example, the number of online courses (item 11) exceeded the reported total number of distance education courses). Phone conversations and e-mail communications with the survey respondents attempted to clarify and validate the responses.

Fifty contacts with respondents resulted in clarifications of information provided by 15 institutions. Based on these clarifications, two trends were identified. First, the majority of respondent errors were the result of unavailable information due either to (a) division of responsibility of credit and noncredit programs and courses among multiple administrators at institutions or (b) incomplete institutional data on the numbers of such programs and courses. Second, the interpretation of item 10 (Types of software used) was problematic. Of 79 responses with blank or N/A entries for item 10, 36 institutions had stated that 100% of their distance learning courses used course management software (CMS). A sampling of these institutions indicated that some respondents assumed that e-mail, chat, and asynchronous discussion were incorporated into CMS, while others responded to the question as if these three items were independent of the CMS. It was also noted that the responses to items 7 and 10 were inconsistent across the respondents. Some respondents reported figures that totaled 100% for the sub-items, while others reported values up to 100% within each sub-item. As a result of these inconsistencies, the analysis of these items was sensitive to the type of response provided.

In some cases, the respondents' entries on the questionnaire were somewhat ambiguous and the researchers were required to use a rigorous decision tree to determine how to enter such data into the spreadsheet. For example, when an item was reported as not applicable to the institution, it was always coded as missing data. When a dash was written as a response, it was coded as missing unless surrounding entries made it clear that the dash represented a zero. Blank entries were always entered as missing data except for item 1, which was entered as a "1" for yes in cases where items 2–4 confirmed that the institution did offer CTE courses via distance education. Each entry in the database was later checked twice for errors and corrected by a second data entry person by comparing the entered data with the original questionnaires. The data from the Microsoft Excel spreadsheet were then copied into SPSS to calculate descriptive statistics, create graphical summaries, and perform comparative analyses.

Data Analysis

The current status of CTE distance learning was determined by measuring the characteristics of a nationally representative sample of community colleges at one point in time. Prespecified variables were used to describe prevalence, or frequencies, as well as trends and common barriers associated with distance learning in postsecondary CTE. In accordance with the research questions, the examined variables reflect the extent of colleges' participation in distance CTE, reasons for offering or not offering distance CTE courses and programs, types of courses, students' profile in such courses, share of Web-based courses in distance CTE, technology used for online CTE, and future trends of the technology usage.

Two types of groupings were used to organize the data and to describe the differences in characteristics among the sampled colleges. The first type of grouping included consolidation of the colleges by locale and by student enrollment figures, hereafter referred to as institution size. These are similar groupings to those used by AACC for their analysis of community college data. The following ranges of institution size were used: 1,000 or fewer students, 1,001–3,000 students, 3,001–10,000 students, and more than 10,000 students. Grouping by college locale included three groups: (1) urban—comprised of large- and mid-size cities, (2) suburban and large town—comprised of fringes of large cities as well as fringes of mid-size cities and large towns, and (3) rural—comprised of small towns and rural areas.

Calculating the range of frequency distributions, and then placing them in rank order from the lowest to highest values, created the second type of grouping. Categories reported by NCES (2000a) were used as a starting point and modified to maximize workable discrimination of the data. Six groups were defined for the number of student enrollments in credit and noncredit CTE distance learning courses (i.e., none, 1–80, 81–300, 301–1,000, 1,001–5,000, 5,001+), the number of credit and noncredit distance learning courses (i.e., none, 1–15, 16–50, 51–100, 101–300, 301+), and credit and noncredit CTE programs (i.e., none, 1–5, 6–10, 11–15, 16–25, 26+). Five groups were defined for the number of Web-based credit CTE courses (i.e., none, 1–25, 26–50, 51–100, 101+), Web-based noncredit CTE courses (i.e., none, 1–75, 76–250, 251–1,000, 1,001+), and Web-based CTE courses provided through external providers and partnerships with other universities and colleges (i.e., none, 1–25, 26–50, 51–100, 101+). In addition to descriptive statistics, an explanatory multivariate technique was used for analysis of the student types that were attracted to CTE distance courses (item 9) and for the analysis of proposed future change of instructional technology in CTE distance learning (item 13).

RESULTS

Factors Associated With Participation in Distance Career and Technical Education

Institutional Participation in Career and Technical Education Distance Learning

Community colleges were asked whether they offered any CTE courses via distance learning during the 2001–2002 academic year. Of the responding community colleges, 76.3% offered CTE courses via distance learning in 2001–2002 (Table 6). CTE distance learning courses were more likely to be offered by community colleges in urban (82.8%) and suburban/large town (80.5%) than in rural (66.3%) areas. Large community colleges were also more likely to offer CTE via distance learning than were small community colleges. About 82% of the colleges with 3,001–10,000 students, which represents 42% of the respondents, offered CTE courses via distance learning. In comparison, 70% of the colleges with 1,001–3,000 students and about 52% of the colleges with fewer than 1,000 students offered CTE courses via distance learning. No substantial differences in offering CTE courses via distance learning were found among the responding community colleges located in East, Midwest, and West regions of the country.

Reasons for Offering Career and Technical Education via Distance Learning

Community colleges that offered CTE distance learning courses and programs during the 2001–2002 academic year (n = 206) were asked to select reasons why they offered CTE via distance learning. The percentage of responses for each reason, by institution region, locale, and size, are shown in Table 7.

The respondents identified reasons related to reaching new students and increasing student access to CTE courses as their primary reasons for offering CTE via distance learning. In particular, the respondents indicated that reaching nontraditional students (83.0%), reducing time constraints for course taking (82%), increasing access to new audiences (79.1%), increasing student access to academic courses (77.7%), and increasing student access by making courses available at convenient locations (74.8%) were important reasons for offering CTE via distance learning. Overall, the least often cited reasons for offering CTE at a distance were reducing the institution's per-student cost (8.3%) and replacing existing campus-based courses (6.8%).

Reasons for Not Offering Career and Technical Education at a Distance

Responding community colleges that did not offer CTE distance learning courses during the 2001–2002 academic year (n = 64) were asked to select reasons why they did not offer CTE courses via distance learning. Percentages of the responses for not offering such courses overall, by institution region, locale, and size are shown in Table 8. Overall, the most commonly cited reasons for not offering CTE via distance learning related to lack of faculty interest (43.8%) and expertise (39.1%), costs associated with program development (43.8%), and limited student market (37.5%). Administrative (up to 9.4%) and legal concerns (up to 7.8%) were the least frequently cited reasons for not offering CTE distance learning courses. Interestingly, no community colleges cited inability to obtain state authorization or accreditation as a reason for not offering CTE via distance learning.

Enrollment in Career and Technical Education Distance Programs and Courses

Distance Career and Technical Education Enrollment

The responding community colleges that offered CTE distance education courses were asked to report their total annual enrollment in credit and noncredit CTE distance courses. For counting purposes, colleges were asked to count a single student enrolled in multiple distance CTE courses as multiple enrollments. Table 9 shows that the average annual enrollment in credit CTE distance courses (958.7) was higher than the average enrollment in noncredit courses (190.6). Average enrollments in credit courses were higher in community colleges located in urban areas (1,323.3) and suburban or large towns (1,039.0) than in rural community colleges (453.2). In contrast, noncredit enrollments were higher in community colleges that were located in rural areas (288.5) than those in urban areas (110.7) and suburban or large towns (198.5). As expected, larger community colleges had a larger average number of credit and noncredit enrollments than did smaller colleges. Of the total enrollment in credit and noncredit CTE courses, 18.9% of the credit enrollment and 10.0% of the noncredit enrollment were in distance education (see Table 10). For almost all community college locales and sizes, the percentage of credit CTE distance enrollments exceeded the percentage of noncredit CTE enrollment.

Table 11 shows the percentage distribution of community colleges offering CTE distance courses according to the number of credit enrollments in those courses. Of the 190 community colleges that offered CTE distance education courses and reported enrollment data, 16.8% had 1–80 students, 25.3% had 81–300 credit enrollments, 26.8% had enrollments 301–1,000, and 24.7% 1,001–5,000. Only 3.2% of the colleges had enrollments greater than 5,000, and 3.2% had no credit enrollments.

Table 12 shows the percentage distribution of community colleges offering CTE distance courses according to the number of noncredit enrollments in those courses. Of the 123 community colleges that offered noncredit CTE distance education courses and reported enrollment data, 52.0% had no noncredit enrollments, while 21.1% had enrollments 1–80 and 16.3% reported enrollments 1–300. Only 4.9% of community colleges reported having enrollments 301–1,000, with 5.7% of the institutions reporting enrollments of 1,001–5,000 students. No community colleges reported enrollments greater than 5,000.

Distance Career and Technical Education Enrollment Trends

The community colleges that offered distance CTE were asked to report the degree to which their distance CTE enrollments were increasing, decreasing, or staying the same. Overall, 88.6% of the community colleges reported that they expected moderate to large increases in their distance CTE enrollments (Table 13). These percentages were consistent across institution locale, region, and size.

Students Attracted to Distance Career and Technical Education Courses

The responding community colleges were asked if their distance CTE courses attracted greater or fewer numbers of various types of students, as compared to their campus-based CTE courses. As shown in Table 14 and Figure 1, the responding community colleges reported that their distance CTE offerings attracted more working professionals (78.5%), students who are currently employed (72.5%), students outside the college district (57.1%), single parents

(57.1%), and part-time students (56.0%). Community colleges reported that their distance courses attracted about the same or fewer full-time, low-income, and minority students, as well as those seeking first-time employment, a new career, or career advancement.

Career and Technical Education Courses and Programs Offered at a Distance

Distance Career and Technical Education Course Offerings

The community colleges that offered CTE distance education courses were asked to report the number of credit CTE distance courses and the number of noncredit CTE distance courses offered at their institution. Table 15 shows that the average number of credit CTE distance courses offered at responding community colleges was 36.5—smaller than the average number of noncredit CTE distance courses offered (43.8). A higher average number of credit courses were offered at institutions in urban settings (45.7) than at those in suburban areas and large towns (32.5) and those in rural settings (29.5). The average number of noncredit courses was higher in community colleges in suburban areas and large towns (50.2) and urban areas (54.8) than in rural areas (21.8). As expected, larger community colleges offered a larger average number of credit and noncredit courses. Large colleges (more than 10,000 students) offered an average of 51.5 credit and 110.1 noncredit courses, while colleges with 1,000 or fewer students offered an average of 23.6 credit and 21.4 noncredit courses.

Distance courses represented less than 20% of the credit and noncredit CTE courses offered by community colleges. As shown in Table 16, on average, 18.4% of credit CTE courses and 19.9% of noncredit CTE courses at the responding community colleges were offered via distance education. For all three locales (urban, suburban/large town, rural), the average percentage of credit distance CTE courses (19.7%, 19.6%, and 15.5%, respectively) was less than the average percentage of noncredit distance CTE courses (21.5%, 19.9%, and 17.7%, respectively). There was no significant correlation between institution size and the percentage of distance credit (r = 0.274) and noncredit CTE courses (r = .0184) offered.

Table 17 shows the percentage distribution of credit and noncredit CTE distance courses according to the total number of CTE distance courses they offered. Of the responding community colleges that offered credit CTE distance education courses, 39.2% offered 1–15 credit courses and 36% offered 16–50, while about 14.3% offered 51–100 courses. Of those institutions that offered some form of distance learning for credit, only 2.6% offered no distance credit CTE courses, and none offered more than 300 such courses. Overall and by locale and institution size, very few institutions reported having no distance CTE courses offered for credit, while most offered 1–50 distance courses for credit. In contrast, 52.4% of reporting institutions offered no noncredit CTE distance courses, while 17.5% offered 1–15, 15.4% offered 16–50, and 14.7% offered more than 50 noncredit CTE distance courses. A smaller percentage of institutions in urban colleges (46.3%) offered no noncredit courses than did those institutions in suburban areas or large towns (60.4%) and rural (51.2%) settings.

Program Offerings

The community colleges that offered CTE distance education courses were asked about the number of distance CTE programs they offered. Table 18 shows that an average of 2.1 CTE distance degree programs, 2.3 credit certificate programs, 1.6 noncredit certificate programs, and

0.8 noncredit licensure/credential programs were offered. A comparison of the credit and noncredit programs shows that the average number of credit programs (degree and certificate) exceeded the average number of noncredit programs (certificate and licensure/credential) overall as well as by locale. Further, the average number of credit degree programs exceeded the average number of credit certificate programs overall as well as by locale, while the average number of noncredit certificate programs exceeded the average number of noncredit licensure/credential programs overall as well as by locale. None of these relationships appeared to hold when considering institution size. With the exception of noncredit certificate programs (r = .0293), there was no significant correlation between institution size and number of programs that offered a degree (r = 0.0), a certificate (r = .002), or a noncredit license/credential (r = .008).

For each program category, distance programs at the responding community colleges represented less than 10% of the CTE programs offered. As shown in Table 19, on average, 7.4% of credit degree CTE programs, 7.1% of the credit certificate programs, 9.9% of the noncredit certificate programs, and 9.1% of noncredit licensure/credential CTE programs were offered via distance education. Suburban and large town community colleges had larger percentages of degree (9.9%), credit certificate (9.6%) and licensure programs (13.2%) than did urban (6.4%, 5.8%, and 10.1%, respectively) and rural institutions (6.1%, 5.6%, and 2.0%, respectively), but a smaller percentage of noncredit certificate programs (7.6% for suburban institutions and 11.3% for both urban and rural institutions). There was no significant correlation between institution size and the percentage of distance CTE programs offered for noncredit certificate (r = 0.087), noncredit licensure/credential (r = - 0.106), credit degree program (r = .120), or credit certificate (r = 0.115).

Table 20 shows the percentage distribution of community colleges that offered CTE programs via distance learning according to the total number of CTE programs they offered. A total of 55.1% of the community colleges that offered CTE distance education courses offered no distance CTE degree programs for credit, while 37.3% offered 1–5 credit degree programs. Only 7.5% of the colleges reported offering more than 5 credit degree programs. A total of 54.6% of the responding community colleges offered no credit certificate programs in CTE via distance education, 37.3% of the community colleges offered 1–5 programs, and only 8.1% of the colleges reported offering more than 5 programs. A total of 80.7% of the responding community colleges offered no noncredit certificate programs in CTE via distance education, while 12% offered 1–5 programs. Only 7.4% of the colleges reported offering more than 5 noncredit certificate programs. A total of 80.7% of the responding community colleges offered no noncredit licensure/credential programs in CTE via distance education, while 12% offered 1–5 programs, and 9.4% of the colleges reported offering more than 5 programs. When considering locale, these overall relationships remained the same. With the exception of urban institutions, the percentage of colleges offering no CTE distance credit, noncredit, certificate and licensure/credential programs exceeded the percentage of colleges offering such programs; urban institutions were equivalent. In addition, across each locale, the percentage of colleges offering 1–5 credit distance CTE programs was about 4–5 times the percentage of colleges offering more than 5 such programs. Further, for noncredit programs, the percentage offering 1–5 distance programs was 1–5 times the number offering more than 5 such programs.

Developing Career and Technical Education Skills Through Distance Learning

Community colleges that offered distance education courses via distance learning were asked to describe the degree to which skill development is being addressed in their distance learning course offerings. Eighty-four percent of the responding community colleges indicated that skill development is being addressed in distance education CTE courses. The responding community colleges were also asked to identify the exemplary CTE distance learning courses on their campuses. An analysis of the list of exemplary courses showed that community colleges are offering skills-based distance learning courses in a wide range of subject areas including agricultural production (e.g., Livestock Production—Sampson Community College, Clinton, NC), computer information and science technology (e.g., Software Applications—Schoolcraft College, Livonia, MI), electronics (e.g., Digital Circuits—Iowa Western Community College, Council Bluffs, IA), and hospitality and hotel management (e.g., Food Handler Certification—Chemeketa Community College, Salem, OR).

Further analysis of the exemplary courses on the institutions' Web sites identified three strategies used to deliver skill training: (a) on-campus skill acquisition in which students come to a campus lab for the hands-on training, (b) internships or clinical experiences in which students work under the tutelage of an authorized supervisor for training, and (c) computer-based simulations in which students engage in virtual training experiences. The following examples highlight each of the skill acquisition models.

On-Campus Skill Acquisition

In this model, distance learning students are required to complete a laboratory course on campus to acquire their hands-on skill training, as are the campus-based students. Although much of the learning takes place at a distance, this model requires that the distance students travel to the college to complete the hands-on portion of a course.

Internships or Clinical Experiences

This model requires distance students to gain hands-on skills while serving as an apprentice or student intern in a work setting. Because the instructor is isolated from the students' work environments, the students provide evidence of their acquired skills by submitting samples of their work, which includes photographs and video footage, along with the signed confirmation of their supervisor.

Computer-Based Simulations

This model uses computer simulation software to provide students with opportunities to apply their skills in a controlled environment. Simulations in areas such as landscape architecture, firefighting techniques, electrical troubleshooting, off-highway truck driving, and manufacturing processes provide students with an opportunity to develop skills without the danger or cost that exists in a "real life" situation.

Internet Use in Distance Career and Technical Education

The community colleges that offered CTE distance education courses were asked to report the number of credit and noncredit CTE distance courses offered via the Internet. Table 21 shows the average number of CTE distance courses offered for credit via the Internet at responding community colleges (36) and the average number of Internet-based noncredit CTE distance courses (67). The average number of Internet courses offered for credit was higher in urban colleges (47.6) than in community colleges located in suburban areas or large towns (33.9) and rural areas (24.0). The average number of noncredit courses for colleges located in suburban areas or large towns (57.8) was higher than for colleges located in urban (25.6) and rural areas (16.9). As expected, larger community colleges had a larger average number of credit and noncredit courses (51.6 and 65.7, respectively, for institutions with more than 10,000 students, compared to 12.6 and 15.3, respectively, for institutions with 1,000 or fewer students).

Table 22 shows that, on average, community colleges offered 74.8% of their credit CTE courses and 46.6% of their noncredit distance CTE courses via the Internet. These credit and noncredit percentages remained fairly constant across locale. There was no significant correlation between institution size and percentage of distance CTE credit courses offered via the Internet (r = -.0046) or percentage of noncredit distance courses offered via the Internet (r = -0.05).

Table 23 shows the percentage distribution of community colleges offering credit and noncredit CTE distance courses via the Internet according to the total number of Internet courses they offered. As a group, 95.1% of community colleges offer credit courses and 41.1% offer noncredit courses. Of the responding community colleges, 52.4% offered 1–25 Internet courses for credit, 22.2% offered 26–50, 20.5% offered more than 50 courses, and 4.9% offered no credit CTE Internet courses. Similar numbers were reported for noncredit Internet courses. Of the responding colleges, 58.9% offered no noncredit Internet courses, while 21.9% offered 1–25 courses and only 19.2% reported offering more than 25 Internet courses.

External Providers and Partnerships

Community colleges with distance education courses were asked the number of Internet CTE courses they provided through external providers and through partnerships with colleges and universities. Table 24 shows that the responding community colleges offered 16.2% of their Internet courses through external providers, and 18.9% through external partnerships with colleges and universities. The external provider percentages were fairly consistent across institution locale, while rural colleges (23.2%) outpaced urban (18.6%) and suburban (15.2%) colleges in college/university partnerships. Both external providers and partnerships were related to institution size. Smaller colleges (3,000 or fewer students) tended to provide a higher percentage of their Internet course offerings through external providers and partnerships than did larger colleges (more than 3,000 students).

Table 25 shows the percentage distribution of community colleges providing Internet-based CTE through external providers. Of the responding community colleges, 69.2% that offered CTE distance education courses offered no Internet courses through external partnerships. The distributions were fairly similar across institution locale (urban, 70.6%; suburban, 67.9%; rural, 68.8%), most institutions using no external providers for their Internet-based CTE courses.

Table 26 shows the percentage distribution of community colleges that provided their Internet-based CTE courses through partnerships with other colleges and universities. Over half of the responding community colleges (53.5%) offered no Internet courses through partnerships with colleges and universities. The distributions were fairly similar across institution locale (urban, 60%; suburban, 51.7%; rural, 47.3%), with most institutions using no external providers for their Internet-based CTE courses.

Internet Technologies

The community colleges that offered CTE distance education courses were asked about the technologies they used in their CTE Internet courses. As shown in Table 27, the most frequently used technologies used in their Internet CTE courses were e-mail (94.3%), course management systems such as Blackboard® and WebCT® (84.2%), and asynchronous discussion lists (64.2%). The least frequently used technologies included high-bandwidth technologies such as desktop videoconferencing (16.1%), voice chat (13.7%), streaming video (37.7%), streaming audio (44.5%), and streaming PowerPoint® (47.3%). A high percentage of community colleges reported no use of high-bandwidth technologies such as desktop videoconferencing (83.9%), voice chat (86.3%), streaming video (62.2%), streaming audio (55.6%), and streaming PowerPoint® (52.7%).

Future Technologies

The community colleges that offered CTE distance education courses were also asked about the technologies they planned to use in their distance CTE courses within the next 3 years. Table 28 and Figure 2 show that the responding community colleges anticipate an increased use of both high-bandwidth and low-bandwidth technologies. Increases in the high-bandwidth technologies include streaming audio/video (87%) and streaming media synchronized with PowerPoint® slides (80.8%), while the low-bandwidth technologies include Internet courses with asynchronous interaction (79.3%), CD-ROM/DVD (77.2%), and asynchronous discussion lists or bulletin boards (72.5%). Most (81.5%) of the responding institutions reported that the use of course management systems is expected to increase.

CONCLUSIONS AND DISCUSSION

Reasons for Offering Career and Technical Education Through Distance Learning

Community colleges are providing career and technical education courses via distance learning to meet the needs of students by increasing access and convenience.

Community colleges are using distance CTE courses and programs to better reach and serve their target student population. Reaching nontraditional students (83.0%), increased freedom from time constraints (82.0%), access to new audiences (79.1%), access to skills-based courses (67.5%), and increasing enrollments (67.5%) the reasons most often cited by community colleges for offering distance CTE courses and programs are all consistent with the community college mission to eliminate barriers to the attainment of higher education faced by many high school graduates and working adults. Distance learning is allowing colleges to expand their course offerings without the capital expenditures associated with additional classroom space, while providing current students and new students the flexibility to take courses within the constraints of their busy lives through the 24/7 availability of distance courses.

The findings in this study are consistent with the most recent NCES survey of distance education in postsecondary institutions (NCES, 2003). Their findings indicate that reduced time constraints, increased convenience, new-audience access, and increasing enrollments are very important reasons for providing programs via distance education. Interestingly, 66% of the community college respondents to the NCES survey also cited increasing quality as a very important reason for offering programs via distance education (NCES, 2003). Only 23.3% of respondents in this CTE study cited quality as a reason. This difference may be due to emphasis on skills development in CTE courses, which remains a significant barrier to providing high-quality courses via distance education.

Community colleges are not providing career and technical education courses via distance learning to reduce costs.

While online courses were once considered an opportunity for institutions to decrease the per-student costs of courses with elevated enrollments, only 8.3% percent of the respondents in this study cited reducing costs as a reason for offering CTE courses via distance education. This finding suggests the existence of a more mature understanding of the costs associated with online course development within the academic community. The data further suggest that community colleges' interest in distance CTE courses and programs is student-driven rather than profit-driven.

Lack of faculty interest and program development costs are the primary reasons that colleges do not offer career and technical education courses via distance learning.

Those community colleges that do not offer distance CTE courses and programs do not provide them for a variety of reasons. Lack of faculty interest and program development costs (43.8%) were reported as the major inhibitors, while administrative concerns such as coherence with the college mission (9.4%), administrative support (4.7%), legal issues (7.8%), and inter-institutional issues (4.7%) were not factors. The recent NCES study of distance education in postsecondary institutions also found that program development costs (77%) and lack of faculty

interest (63%) were major inhibitors to starting or expanding their distance education course offerings (NCES, 2003).

Distance Learning Courses and Programs in Career and Technical Education

Hands-on skill development is being addressed in distance learning programs.

Eighty-four percent of the responding community colleges indicated that skill development is addressed in their distance education CTE courses. At first glance, distance learning would seem to be antithetical to skill training. However, with businesses demanding increasing employee flexibility and a desire to re-skill their employees, the need for just-in-time skill training continues to increase. Limiting skill training to only those students who are able to attend traditional classroom community college courses severely constrains the pool of potential workers.

Because of the hands-on nature of skill-based learning, the delivery of distance instruction can impose barriers that must be overcome by the institution. Colleges are overcoming this barrier by blending distance learning with more traditional approaches to provide the hands-on experience needed to develop technical skills. This innovative approach to blending distance learning with skill training falls into three broad categories: (a) on-campus skill acquisition, (b) internships or clinical experiences, and (c) computer-based simulations.

The percentage of community colleges providing career and technical education courses via distance learning is less than the percentage of 2-year institutions that provide any distance courses.

This study found that 76.3% of community colleges provided CTE courses via distance while another recent national study (NCES, 2003) found that 90% of public 2-year institutions provided some distance courses in the academic year 2000–2001. The reason for the lag in the development of distance CTE courses may be that the "hands-on" nature of many CTE courses leads many instructors, administrators, and students to believe that they are best delivered in the traditional face-to-face classroom (Synergy Plus, 2002). While this gap may begin to narrow as community college CTE courses begin to incorporate high-bandwidth technologies that provide opportunities for virtual "hands-on" experiences, it is expected that many CTE courses will always require some clinical or laboratory component for learners to demonstrate skills acquired in an authentic setting.

A significant portion of community college career and technical education courses is offered via distance learning.

Distance courses, on average, comprised nearly one fifth of the credit CTE courses and one fifth of the noncredit CTE courses offered at community colleges. These numbers suggest that both credit and noncredit programs have made inroads in the development of distance CTE courses. Since current and previous NCES distance education studies focused solely on credit-granting courses, the data from this study become the first to illuminate the extent to which the noncredit population on the community college campus is providing distance offerings. More research needs to be directed towards this understudied population.

Community colleges are more likely to offer credit career and technical education courses than noncredit career and technical education courses via distance learning.

Of those community colleges that offer distance CTE courses, 97.4% offer courses for credit, while fewer than half offer noncredit courses (47.6%). Coupled with the previous conclusion, these data suggest that a few community colleges are providing large numbers of noncredit CTE courses, while most are not providing any. A further explanation could be related to the non-report of noncredit CTE numbers in this study. Consistently throughout the data collection, the reporting of credit numbers for programs exceeded the reporting of noncredit numbers. The lack of clarity of this conclusion further suggests the need for additional research to understand noncredit CTE courses provided via distance learning.

Community colleges are offering few career and technical education programs that can be completed fully via distance learning.

For the four categories of CTE programs included in this study (credit degree, credit certificate, noncredit certificate, and noncredit licensure/credential), no category provided for more than 10% of its programs to be completed at a distance. On average, between 0.8 and 2.3 programs were offered in each category. In addition, in each category, the percentage of institutions reporting no distance CTE programs exceeded the percentage of institutions offering CTE distance programs. There are two possible reasons for the low number of distance CTE programs offered. First, the low number could be a result of the hands-on nature of many of the courses within the program, making them more easily conducted face-to-face. Second, offering a complete CTE program online is dependent upon the willingness of the academic faculty to invest their time and energy in the development of online core courses. In cases where distance degrees are in place, the institution provides the distance core, while the department provides distance access only to courses in its major area of study. An example is the University System of Georgia, which provides an online core curriculum on which academic departments in any of the systems' 2-year and 4-year institutions can build degree programs. In contrast, Jefferson State Community College in Birmingham, AL, provides its Funeral Service Education program online, but the academic courses required for entry into this program are taken in traditional face-to-face classrooms.

Community colleges are more likely to offer degree and credit certificate programs than they are to offer noncredit certificate and noncredit licensure/credentialing programs.

Substantially more institutions reported having no noncredit certificate (80.7%) and noncredit licensure/credential (85.5%) distance CTE programs than institutions reporting no credit degree (55.1%) and credit certificate (54.6%) CTE programs. This conclusion is consistent with an earlier conclusion about credit and noncredit distance CTE course offerings, and further supports the need for additional study of noncredit distance CTE offerings.

Enrollment in Career and Technical Education Distance Learning Courses and Programs

Enrollments in distance learning courses and programs are expected to continue increasing.

The people most closely associated with distance learning in CTE were optimistic about the future of distance learning in CTE. Nearly 90% of these leaders in distance learning reported that their colleges were experiencing a moderate or large increase in enrollments in distance CTE courses in the 2000–2001 school year. This finding is similar to the findings from other national studies that examined the prevalence of distance learning—not just in CTE, but also in all programs in higher education. The Web-based Education Commission (2000) found that, between 1998 and 2010, "full-time enrollment is projected to increase by 22% as large numbers of high school graduates enter college" (p. 5). A recent study of distance education in postsecondary institutions by NCES (2002c) projected an 11% increase in distance enrollment at public 2-year institutions and a 20% increase at private 2-year institutions by 2012.

Distance students are enrolling in credit courses more often than in noncredit courses.

The average enrollment in distance CTE credit courses exceeded enrollment in noncredit distance CTE courses by a ratio of 5:1, and over half of the institutions do not have any students enrolled in noncredit CTE distance courses. CTE students appear to enroll in coursework that grants academic credit instead of coursework that does not. CTE students do not obtain their skills in a vacuum of skills-based courses only, but rather engage in a well-rounded academic curriculum that prepares them well for either further academic work or immediate entry to the job market.

Student Characteristics and Attraction to Distance Education

In comparison to on-campus classes, community college distance learning career and technical education courses attract more working professionals, students who are currently employed and working at part-time jobs, and single parents.

Many community college students are "citizen-students" (Vaughan, 2000, p. 14). These students are concerned with working and paying taxes, buying homes, supporting families, and other responsibilities associated with the everyday role of a full-time citizen. Their ability to attend college is dependent upon the availability of both money and time. Distance learning courses are not only a good dollar value for students, but also a good fit for busy student lifestyles.

Community colleges make occupational licensure and certification programs available to students (Kasper, 2002/2003). They also partner with local employers and make facilities available for workforce training. These programs and partnerships bring working professionals to the campus. As distance learning courses are components of these programs and partnerships, this also could account for these colleges attracting more working professionals.

Traditionally underserved populations may or may not be disadvantaged by distance career and technical education courses and programs.

Community colleges reported that their distance CTE courses and programs attract the same or fewer low-income and minority students, those seeking first-time employment or career advancement, and full-time students. Over half of the community colleges reported that their distance CTE courses attracted about the same number of low-income and minority students as their campus-based CTE courses, and fewer than 40% reported that the distance CTE courses attracted fewer of these students. Given the ongoing debates related to the digital divide, digital literacy, and digital equity, particularly in urban and rural areas (de los Santos, de los Santos, & Milliron, 2003). Further research is needed to better understand the participation of underserved populations in distance CTE.

Internet Use in Career and Technical Education

Internet-based courses are the most prominent form of distance learning in community college career and technical education programs, especially in credit courses.

It may be useful for benchmarking purposes to know that community colleges teach an average of 36 credit CTE courses and 67 noncredit CTE courses via the Internet. However, the important finding is that such a large proportion of the CTE courses taught via distance learning are delivered using the Internet. The Internet courses represent nearly three fourths of all of their distance courses offered for credit and nearly half of their noncredit courses. Given that the feasibility of using the Internet is a fairly recent phenomenon, these data show that the community colleges have made significant progress in developing Internet-based courses in a short amount of time. These data also imply that other forms of distance learning delivery (e.g., correspondence courses, interactive television) may be replaced in large part by Internet-based courses.

The findings from this study also show that the use of the Internet for course delivery has increased dramatically in recent years, particularly in CTE programs. This study found that 95.1% of community colleges offer CTE credit courses via the Internet and 41.1% offer noncredit CTE courses via the Internet. In contrast, Green (2000) found that 74% of community colleges were using the Internet for course delivery. It is important to note that Green's study focused on community college programs and courses in general, while this study focused solely on CTE courses and programs.

Many colleges that offer career and technical education courses through distance learning are not using the Internet as a delivery vehicle, especially in noncredit career and technical education courses.

In spite of the fact that many colleges are using the Internet for the delivery of CTE courses, there are still a number of institutions that offer no CTE courses via the Internet. Over half of the institutions that offer some form of distance CTE had no Internet-based noncredit courses. It is unclear why the community colleges use the Internet for the majority of their credit courses (74.8%) but for fewer than half of their noncredit courses (46.6%). The data clearly show that the lack of Internet-based noncredit courses is neither a function of institution size or locale. The differentiation between credit and noncredit courses might be the result of having more noncredit

courses (67 per institution) than credit distance courses (36 per institution) already developed for "traditional" distance delivery, and it could be too costly in terms of time and money to redesign courses for the Internet when they are already effective in their current format. It could also be that many of the noncredit courses are standardized for certification purposes (e.g., Microsoft or Cisco training), and modification of the courses is outside the authority of the college faculty. If part-time faculty are the ones most likely to teach the noncredit courses, then it is possible that they have neither the time, the expertise, nor the authority to redesign courses for Internet delivery. It is also possible that the noncredit courses are more skill-based than the credit courses, which may make them less feasible to offer online. More research is needed to determine why the noncredit CTE courses are not as prevalent in distance learning.

Community colleges are partnering with external providers (e.g., commercial vendors) and other colleges and universities to make credit and noncredit career and technical education courses available to students.

According to the survey findings, nearly one third of all credit and noncredit courses were made available to students via external providers, and more than half of the community colleges offering CTE courses had established partnerships with other colleges and universities. Smaller community colleges (those with 3,000 or fewer students) used this service more than those with a larger number of students.

Faced with competitive markets, businesses frequently form joint ventures as a way to share strengths and pool resources (Pocorobba, 1999). These joint ventures, or partnerships, are formed to meet single or multiple objectives. Community colleges are forming partnerships with external providers and other colleges and universities for similar reasons. They may enter into a simple partnership with a software provider to develop a set of courses (Rinear, 2002), or they may enter into a complex partnership by becoming members of a multi-institution consortium that may be regional, national, or international in scope. According to the NCES (2003), 60% of 2-year institutions that offered distance education courses in 2000–2001 participated in some type of distance education consortium (state, system, regional, national, and international).

Internet-based career and technical education courses in the community college currently rely on low-bandwidth technologies.

Although community colleges are actively involved in the delivery of CTE courses using the Internet, they are using what can be classified as "low-bandwidth" technologies. The most common technologies being used in Internet-based CTE courses are course management systems, e-mail, text chat, and asynchronous discussion. What is lacking in these technologies is the ability to incorporate multimedia and real-time exchange of information among individuals or groups within a course. Very few of the colleges are using the high-bandwidth technologies in their Internet-based CTE courses. These types of technologies include streaming audio and video that may by synchronized with presentations (e.g., PowerPoint®), real-time voice chat, and desktop videoconferencing. By taking advantage of fast connection speeds, these technologies make it possible to include multimedia and real-time exchanges of voice and images.

Why aren't the community colleges taking advantage of the cutting edge technologies in their CTE Internet-based courses? There are likely a variety of reasons for this. First, numerous studies comparing traditional classroom-based instruction with technology-supported instruction have found no significant differences on critical educational variables such as learning outcomes and student satisfaction (Russell, 1999). Those involved in the field of instructional technology now conclude that the technology used in an online program is not as important as other instructional factors, such as pedagogy and course design (Phipps & Merisotis, 1999). Just because a technology is not "cutting-edge" does not mean that it is not an effective tool for education. The colleges may also have purposely selected low-bandwidth technologies with the end user in mind. High-bandwidth technologies demand a fast connection speed for the end user as well as a computer that has a fast processor and lots of memory and file storage space. Incorporating high-bandwidth technologies into CTE courses may prevent students from participating because they do not have access to the computers or Internet connections needed to support these more advanced technologies. Since the colleges are using distance learning to attract nontraditional students, their decision to design their distance learning course around the lowest common denominator is probably an appropriate choice.

Growth is expected in virtually all forms of Internet-based career and technical education courses and technologies within the next 3 years.

Most community colleges expect to see continued growth in the development and delivery of Internet-based CTE courses. These future courses will see expanded use of course management systems, asynchronous discussion technologies, CD-ROM/DVD for the delivery of course content, and streaming media for delivery of live or recorded audio and video. It can be expected that the CTE courses taught via distance learning in the future will rely less on the exchange of audio and video tapes, fax machines, instructional television, and one-way live audio or video.

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Table 1
Distribution of Community Colleges Responding to the Survey

Institutional Characteristic	Population (%)	Sample (%)	Respondents (%)
All Institutions	*N* = 1,015	*n* = 512	*n* = 270
Region			
East	41.1 (417)	41.6 (213)	42.2 (114)
Midwest	26.2 (266)	30.0 (138)	30.0 (81)
West	32.7 (332)	31.4 (161)	27.8 (75)
Institution Locale			
Urban	33.8 (343)	34.0 (174)	34.4 (93)
Suburban & Large Town	30.0 (304)	29.3 (150)	30.4 (82)
Rural	36.2 (368)	36.7 (188)	35.2 (95)
Institution Size			
1,000 or fewer	8.7 (88)	8.6 (44)	8.5 (23)
1,001–3,000	33.5 (340)	34.4 (176)	33.4 (90)
3,001–10,000	40.4 (410)	42.8 (219)	42.2 (114)
More than 10,000	13.6 (138)	13.7 (70)	15.9 (43)
Unknown	3.8 (39)	0.0 (0)	0.0 (0)

Note. Percentages are computed within each classification variable. Numbers in parentheses represent the actual number of community colleges in each category.

Table 2
Comparison of Respondents to Non-Respondents

Sample *x* Campus Type (Single-Campus/Multi-Campus)

	Campus Type[a]									
Sample	CCD	CMC	DIS	MCM	SNG	UAU	UCA	UCP	Unknown	Total
Non-Respondents	25	13	1	49	135	0	7	5	7	242
Usable Responses	27	17	1	65	145	1	8	4	2	270
Total	52	30	2	114	280	1	15	9	9	512

Note. $\chi^2(8, n = 512) = 5.654$, $p = .686$.

[a]Campus type codes: College of Multi-College District (CCD), Campus of Multi-Campus System (CMC), District Office of Multi-College District (DIS), Main Campus of Multi-Campus College (MCM), Single-Campus College (SNG), Administrative Unit of University System (UAU), 2-year Campus of University, Separate Accreditation (UCA), 2-year Campus of University, Sharing Accreditation (UCP).

Sample *x* Institution Size

	Institution Size				
Sample	≤1000	1,001–3000	3,001–10,000	>10,000	Total
Non-Respondents	24	86	105	27	242
Usable Responses	23	90	114	43	270
Total	47	176	219	70	512

Note. $\chi^2(3, n = 512) = 2.616$, $p = .455$.

Sample *x* Location Type

	Institution Locale			
Sample	Urban	Suburban	Rural	Total
Non-Respondents	81	68	93	242
Usable Responses	93	82	95	270
Total	174	150	188	512

Note. $\chi^2(2, n = 512) = .626$, $p = .731$.

Sample *x* Region

	Region								
Sample	New England	Mid-East	Great Lakes	Plains	South-east	South-west	Rocky Mtns.	Far-West	Total
Non-Respondents	12	24	28	29	63	36	12	38	242
Usable Responses	10	32	47	34	72	26	8	41	270
Total	22	56	75	63	135	62	20	79	512

Note. $\chi^2(7, n = 512) = 8.155$, $p = .319$.

Table 3
Comparison of Respondents to Target Population

Target Population *x* Campus Type (Single-Campus/Multi-Campus)

	Campus Type[a]									
Target Population	CCD	CMC	DIS	MCM	SNG	UAU	UCA	UCP	Unknown	Total
Population	46	32	2	93	270	0	9	6	5	463
Respondents	28	17	1	65	144	1	8	4	2	270
Total	74	49	3	158	414	1	17	10	7	733

Note. $\chi^2(8, n = 733) = 4.879$, $p = .770$.
[a]Campus type codes: College of Multi-College District (CCD), Campus of Multi-Campus System (CMC), District Office of Multi-College District (DIS), Main Campus of Multi-Campus College (MCM), Single-Campus College (SNG), Administrative Unit of University System (UAU), 2-year Campus of University, Separate Accreditation (UCA), 2-year Campus of University, Sharing Accreditation (UCP).

Target Population *x* Institution Size

	Institution Size				
Target Population	≤1000	1,001–3000	3,001–10,000	>10,000	Total[a]
Population	38	161	180	61	440
Respondents	24	90	113	43	270
Total	62	251	293	104	710

Note. $\chi^2(3, n = 710) = 1.036$, $p = .792$. [a] Data missing for 23 institutions in population.

Target Population *x* Location Type

	Institution Locale			
Target Population	Urban	Suburban	Rural	Total
Population	154	138	171	463
Respondents	93	82	95	270
Total	247	220	266	733

Note. $\chi^2(2, n = 733) = .233$, $p = .890$.

Target Population *x* Region

	Region									
Target Population	U.S. Service	New England	Mid-East	Great Lakes	Plains	South-east	South-west	Rocky Mtns.	Far-West	Total
Population	1	17	46	66	55	127	53	20	78	463
Respondents	0	10	32	47	34	72	26	8	41	270
Total	1	27	78	113	89	199	79	28	119	733

Note. $\chi^2(8, n = 733) = 4.014$, $p = .856$.

Table 4

Comparison of Non-Respondents to Target Population

Non-Respondents *x* Campus Type (Single-Campus/Multi-Campus)

	Campus Type[a]									
	CCD	CMC	DIS	MCM	SNG	UAU	UCA	UCP	Unknown	Total
Population	46	32	2	93	270	0	9	6	5	463
Non-Respondents	34	20	1	55	152	0	7	6	7	282
Total	80	52	3	148	422	0	16	12	12	745

Note. $\chi^2(7, n = 745) = 4.531$, $p = .717$.

[a]Campus type codes: College of Multi-College District (CCD), Campus of Multi-Campus System (CMC), District Office of Multi-College District (DIS), Main Campus of Multi-Campus College (MCM), Single Campus College (SNG), Administrative Unit of University System (UAU), 2-year Campus of University, Separate Accreditation (UCA), 2-year Campus of University, Sharing Accreditation (UCP).

Non-Respondents *x* Institution Size

	Institution Size				
	≤1000	1,001–3000	3,001–10,000	>10,000	Total[a]
Population	38	161	180	61	440
Non-Respondents	26	89	117	34	266
Total	64	250	297	95	706

Note. $\chi^2(3, n = 706) = 1.213$, $p = .750$. [a] Data missing for 23 institutions in population and 16 in non-respondent pool.

Non-Respondents *x* Location Type

	Institution Locale			
	Urban	Suburban	Rural	Total
Population	154	138	171	463
Non-Respondents	96	84	102	282
Total	250	222	273	745

Note. $\chi^2(2, n = 745) = .060$, $p = .971$.

Non-Respondents *x* Region

	Region									
	U.S. Service	New England	Mid-East	Great Lakes	Plains	South-east	South-west	Rocky Mtns.	Far-West	Total
Population	1	17	46	66	55	127	53	20	78	463
Non-Respondents	0	14	26	32	32	72	42	13	51	282
Total	1	31	72	98	87	199	95	33	129	745

Note. $\chi^2(8, n = 745) = 4.632$, $p = .796$.

Table 5
Comparison of Early to Late Respondents

Response Time *x* Campus Type (Single-Campus/Multi-Campus)

	Campus Type[a]									
Response Time	CCD	CMC	DIS	MCM	SNG	UAU	UCA	UCP	UNKNOWN	Total
Early Response	12	14	1	29	66	1	4	3	0	130
Late Response	15	3	0	36	79	0	4	1	2	140
Total	27	17	1	65	145	1	8	4	2	270

Note. $\chi^2(7, n = 270) = 14.019$, $p = .081$.
[a]Campus type codes: College of Multi-College District (CCD), Campus of Multi-Campus System (CMC), District Office of Multi-College District (DIS), Main Campus of Multi-Campus College (MCM), Single Campus College (SNG), Administrative Unit of University System (UAU), 2-year Campus of University, Separate Accreditation (UCA), 2-year Campus of University, Sharing Accreditation (UCP).

Response Time *x* Institution Size

	Institution Size				
Response Time	≤1000	1,001–3000	3,001–10,000	>10,000	Total
Early Response	15	43	51	21	130
Late Response	8	47	63	22	140
Total	23	90	114	43	270

Note. $\chi^2(3, n = 270) = 3.229$, $p = .358$.

Response Time *x* Location Type

	Institution Locale			
Response Time	Urban	Suburban	Rural	Total
Early Response	46	34	50	130
Late Response	47	48	45	140
Total	93	82	95	270

Note. $\chi^2(2, n = 270) = 2.297$, $p = .3017$.

Response Time *x* Region

	Region								
Response Time	New England	Mid-East	Great Lakes	Plains	South-east	South-west	Rocky Mtns.	Far-West	Total
Early Response	3	14	23	18	31	18	2	21	130
Late Response	7	18	24	16	41	8	6	20	140
Total	10	32	47	34	72	26	8	41	270

Note. $\chi^2(7, n = 270) = 9.141$, $p = .243$.

Table 6
Distribution of Community Colleges Offering CTE Courses (2001–2002)

Institutional Characteristic	*N*	Institutions Offering Distance CTE (%)	Institutions Not Offering Distance CTE (%)
All respondents	270	76.3	23.7
Regions			
East	114	76.3	23.7
Midwest	81	76.5	23.5
West	75	76.0	24.0
Institution Locale			
Urban	93	82.8	17.2
Suburban or Large Town	82	80.5	19.5
Rural	95	66.3	33.7
Institution Size			
1,000 or fewer	23	52.2	47.8
1,001–3,000	90	70.0	30.0
3,001–10,000	114	81.6	18.4
More than 10,000	43	88.4	11.6

Note. Percentages are computed within each classification variable. *n* represents the actual number of responding institutions.

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Table 7
Why Community Colleges Offered CTE Distance Education Courses and Programs (2001–2002)

Reasons for Offering CTE Distance Courses	Overall	Region			Locale			Institution Size			
		East	Midwest	West	Urban	Suburban/ Large Towns	Rural	≤1000	1,001-3000	3,001-10,000	>10,000
n	206	87	62	57	77	66	63	12	63	93	38
Reaching New Students											
• Reaching nontraditional students	83.0	78.2	88.7	84.2	77.9	90.9	81.0	91.7	74.6	83.9	92.1
• Increasing access to new audiences	79.1	80.5	79.0	77.2	79.2	83.3	74.6	83.3	71.4	79.6	89.5
• Increasing student enrollment	67.5	59.8	71.0	75.4	72.7	65.2	63.5	66.7	57.1	68.8	81.6
Increasing Student Access											
• Reducing time constraints for course taking	82.0	79.3	79.0	89.5	80.5	84.8	81.0	83.3	82.5	82.8	78.9
• Increasing student access to academic courses	77.7	79.3	74.2	78.9	76.6	77.3	79.4	83.3	77.8	72.0	89.5
• Increasing student access by making courses available at convenient locations	74.8	73.6	74.2	77.2	71.4	81.8	71.4	50.0	77.8	72.0	84.2
• Increasing access to skills-based courses	67.5	63.2	71.0	70.2	64.9	65.2	73.0	75.0	61.9	67.7	73.7
Course Improvement											
• Supplementing campus-based courses	66.0	63.2	71.0	64.9	62.3	72.7	63.5	58.3	74.6	52.7	86.8
• Improving the quality of course offerings	23.3	25.3	22.6	21.1	23.4	24.2	22.2	33.3	19.0	22.6	28.9
• Replacing campus-based courses	6.8	4.6	6.5	10.5	6.5	4.5	9.5	16.7	6.3	4.3	10.5
Reducing Cost											
• Making education more affordable for students	26.2	25.3	24.2	29.8	20.8	31.8	27.0	25.0	19.0	28.0	34.2
• Reducing the institution's per-student cost	8.3	5.7	6.5	14.0	11.7	4.5	7.9	0	3.2	12.9	7.9
Other											
• Meeting the needs of local employers	53.4	52.9	48.4	59.6	49.4	62.1	49.2	41.7	41.3	58.1	65.8

Note. Percentages are computed within each classification variable. *n* represents the actual number of the responding community colleges overall and within each classification group by colleges' fall enrollments, region, or locale.

Table 8
Why Community Colleges Did Not Offer CTE Distance Learning Courses (2001–2002)

Reasons for Not Offering CTE Distance Courses	Overall	Region			Locale			Institution Size			
		East	Midwest	West	Urban	Suburban/ Large Town	Rural	≤1000	1,001–3000	3,001–10,000	>10,000
n	64	27	19	18	16	16	32	11	27	21	5
Faculty Inhibitors											
• Lack of faculty interest	43.8	37.0	47.4	50.0	37.5	50.0	43.8	27.3	51.9	42.9	40.0
• Lack of faculty expertise	39.1	29.6	47.4	44.4	50.0	31.3	37.5	45.5	37.0	42.9	20.0
• Lack of faculty rewards or	28.1	14.8	31.6	44.4	37.5	18.8	28.1	18.2	33.3	28.6	20.0
• Concerns about faculty workload	28.1	29.6	26.3	27.84	18.8	37.0	28.1	36.4	33.3	14.3	40.0
Economic Concerns											
• Program development costs	43.8	48.1	52.6	27.8	31.3	50.0	46.9	45.5	44.4	42.9	40.0
• Lack of perceived need (limited student market)	37.5	40.7	31.6	38.9	37.5	37.5	37.5	36.4	29.6	52.4	20.0
• Equipment purchase and/or maintenance costs	29.7	33.3	26.3	27.8	25.0	12.5	40.6	27.3	44.4	14.3	20.0
• Limited technological infrastructure to support distance learning	25.0	29.6	31.6	11.1	18.8	18.8	31.3	54.5	18.5	14.3	40.0
Curriculum Concerns											
• Concerns about course quality	25.0	29.6	15.8	27.8	12.5	31.3	28.1	18.2	29.6	23.8	20.0
• Concerns about assessment (cheating, user authentication)	15.6	11.1	10.5	27.8	18.8	12.5	15.6	9.1	18.5	14.3	20.0
Administrative Concerns											
• Lack of fit with institution's mission	9.4	14.8	10.5	0	6.3	6.3	12.5	36.4	3.7	0	20.0
• Legal concerns (e.g., intellectual property rights, copyright laws)	7.8	7.4	10.5	5.6	12.5	6.3	6.3	27.3	7.4	0	0
• Lack of support from institution administration	4.7	3.7	5.3	5.6	0	6.3	6.3	0	7.4	0	20.0
• Inter-institutional issues (i.e., allocation of financial aid, course credit)	4.7	3.7	5.3	5.6	6.3	6.3	3.1	0	7.4	4.8	0
• Restrictive federal, state, or local policies (e.g., limitations in the number of distance learning credits students may earn, student ineligibility for financial aid)	1.6	3.7	0	0	6.3	0	0	9.1	0	0	0
Other											
• Lack of access to library or other resources for instructional support	1.6	3.7	0	0	0	0	3.1	9.1	0	0	0
• Inability to obtain state authorization or program accreditation	0	0	0	0	0	0	0	0	0	0	0

Note. Percentages are computed within each classification variable. *n* represents the actual number of the responding community colleges overall and within each classification group by colleges' fall enrollments, regions, or locales.

Table 9
Average Annual Enrollment in Distance CTE Courses at Community Colleges (2001–2002)

Institutional Characteristic	*n*	Credit Distance CTE Enrollment	*n*	Noncredit Distance CTE Enrollment
All Institutions	190	958.7	123	190.6
Region				
East	81	873.0	54	112.1
Midwest	58	1,039.0	38	341.7
West	51	1,003.5	31	142.1
Institution Locale				
Urban	70	1,323.3	48	110.7
Suburban or Large Town	60	1,039.0	39	198.5
Rural	60	453.2	36	288.5
Institution Size				
1,000 or fewer	10	296.7	6	37.3
1,001–3,000	60	437.4	34	167.3
3,001–10,000	87	962.2	59	180.4
More than 10,000	33	2,098.2	24	286.8

Note. *n* represents the actual number of institutions in each category. 190 of the 206 responding institutions provided distance CTE credit enrollment numbers, and 123 provided distance CTE noncredit enrollment numbers.

Table 10
Percentage of CTE Enrollment Offered via Distance (2001–2002)

Institutional Characteristic	*n*	Credit Distance CTE Enrollment (%)	*n*	Noncredit Distance CTE Enrollment (%)
All Institutions	189	18.9	98	10.0
Region				
East	81	21.8	47	3.9
Midwest	58	17.1	34	15.0
West	50	16.4	17	16.8
Institution Locale				
Urban	69	18.9	40	10.7
Suburban or Large Town	60	20.1	31	9.7
Rural	60	17.7	27	9.2
Institution Size				
1,000 or fewer	10	21.7	5	4.8
1,001–3,000	60	14.9	27	6.8
3,001–10,000	86	21.4	48	11.5
More than 10,000	33	18.9	18	12.2

Note. *n* represents the actual number of institutions in each category. 189 of 206 responding institutions provided distance and campus-based CTE credit enrollment numbers, and 98 provided distance and campus-based CTE noncredit enrollment numbers.

Table 11
Percentage Distribution of Enrollment in CTE Distance Credit Courses (2001–2002)

Enrollment Range	*n*	None	1–80	81–300	301–1000	1,001–5,000	>5,000
All Institutions	190	3.2	16.8	25.3	26.8	24.7	3.2
Region							
East	81	2.5	21.0	22.2	24.7	28.4	1.2
Midwest	58	1.7	13.8	22.4	34.5	24.1	3.4
West	51	5.9	13.7	33.3	21.6	19.6	5.9
Institution Locale							
Urban	70	7.1	12.9	20.0	22.9	31.4	5.7
Suburban or Large Town	60	0	11.7	30.0	26.7	28.3	3.3
Rural	60	1.7	26.7	26.7	31.7	13.3	0
Institution Size							
1,000 or fewer	10	0	50.0	10.0	30.0	10.0	0
1,001–3,000	60	1.7	28.3	26.7	33.3	10.0	0
3,001–10,000	87	5.7	10.3	28.7	24.1	27.6	3.4
More than 10,000	33	0	3.0	18.2	21.2	48.5	9.1

Note. *n* represents the actual number of institutions in each category. 190 of 206 institutions reported credit CTE enrollment numbers.

Table 12
Percentage Distribution of Enrollment in CTE Distance Noncredit Courses (2001–2002)

Enrollment Range	*n*	None	1–80	81–300	301–1,000	1,001–5,000	>5,000
All Institutions	123	52.0	21.1	16.3	4.9	5.7	0
Region							
East	54	42.6	31.5	20.4	1.9	3.7	0
Midwest	38	52.6	15.8	15.8	7.9	7.9	0
West	31	67.7	9.7	9.7	6.5	6.5	0
Institution Locale							
Urban	48	50.0	25.0	14.6	8.3	2.1	0
Suburban or Large Town	39	53.8	15.4	20.5	5.1	5.1	0
Rural	36	52.8	22.2	13.9	0	11.1	0
Institution Size							
1,000 or fewer	10	50.0	33.3	16.7	0	0	0
1,001–3,000	25	60.0	24.0	4.0	0	12.0	0
3,001–10,000	59	39.0	28.8	22.0	6.8	3.4	0
More than 10,000	24	66.7	4.2	16.7	4.2	8.3	0

Note. *n* represents the actual number of institutions in each category. 123 of 206 institutions reported noncredit CTE enrollment numbers.

Table 13
Enrollment Trends in Distance CTE

Institutional Characteristic	*n*	Large Decrease	Moderate Decrease	Stable Enrollment	Moderate Increase	Large Increase
All Institutions	193	1.6	1.0	8.8	54.9	33.7
Institution Locale						
Urban	71	2.8	1.4	9.9	52.1	33.8
Suburban or Large Town	62	1.6	0	6.5	59.7	32.3
Rural	60	0	1.7	10.0	53.3	35.0
Institution Size						
1,000 or fewer	11	0	0	18.2	36.4	45.5
1,001–3,000	58	0	1.7	13.8	58.6	25.9
3,001–10,000	88	3.4	1.1	6.8	58.0	30.7
More than 10,000	36	0	0	2.8	47.2	50.0

Note. *n* represents the actual number of institutions in each category. 193 of 206 institutions reported enrollment trends in distance CTE.

Table 14
Students Attracted to Distance CTE Courses and Programs

	n	Attract Fewer	Attract the Same	Attract More
Attract More Students				
Working professionals	191	8.4	13.1	78.5
Students who are currently employed	189	5.8	21.7	72.5
Students outside college districts	188	15.4	27.1	57.1
Single parents	184	8.7	34.2	57.1
Part-time students	191	10.5	33.5	56.0
Attract the Same or Fewer				
Full-time students	191	46.6	44.5	8.9
Low-income students	185	37.8	55.7	6.5
Minority students	186	36.0	61.3	2.7
Students seeking first-time employment	181	25.4	68.0	6.6
Students seeking new career	182	12.6	54.4	33.0
Students seeking career advancement	182	6.6	50.0	43.4

Note. Percentages based on the number of respondents for each question.

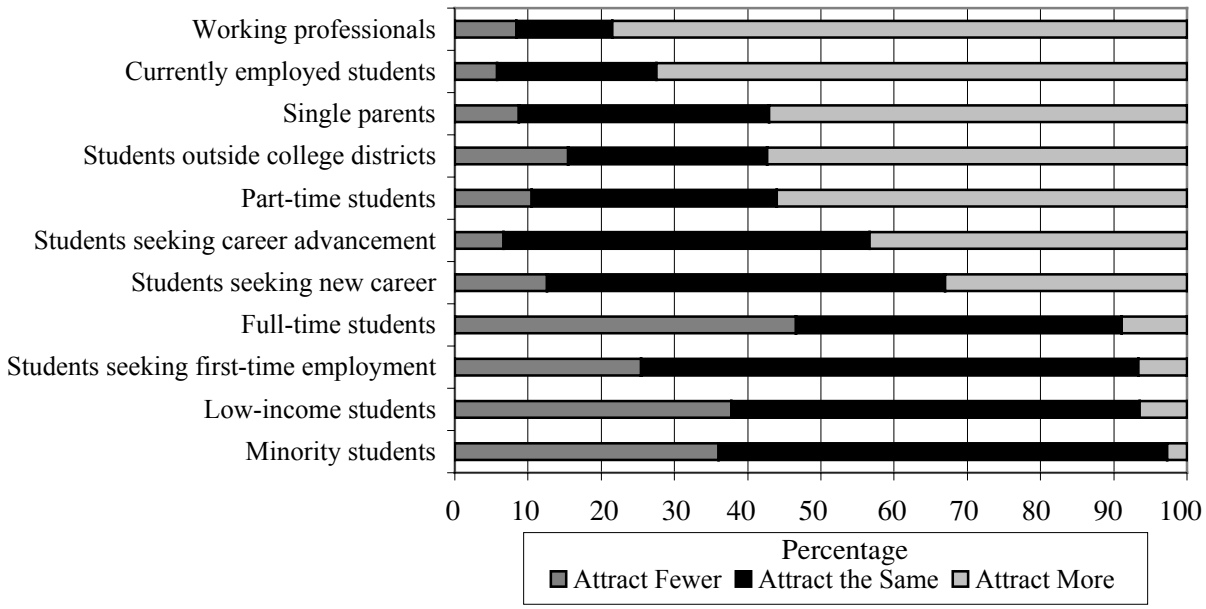

Figure 1. Students Attracted to Distance CTE Courses and Programs

Table 15
Average Number of Distance CTE Courses Offered (2001–2002)

Institutional Characteristic	*n*	Credit Distance CTE Courses	*n*	Noncredit Distance CTE Courses
All Institutions	189	36.5	143	43.8
Region				
East	82	41.0	64	31.9
Midwest	56	37.9	42	89.5
West	51	27.8	37	12.5
Institution Locale				
Urban	70	45.7	54	54.8
Suburban or Large Town	63	32.5	48	50.2
Rural	56	29.5	41	21.8
Institution Size				
1,000 or fewer	8	23.6	8	21.4
1,001–3,000	60	31.0	37	42.0
3,001–10,000	88	35.8	72	23.2
More than 10,000	33	51.5	26	110.1

Note. 189 of the 206 responding institutions provided the number of distance CTE credit courses, and 144 provided the number of distance CTE noncredit courses.

Table 16
Percentage of CTE Courses Offered via Distance Learning (2001–2002)

Institutional Characteristic	*n*	Credit Distance CTE Courses (%)	*n*	Noncredit Distance CTE Courses (%)
All Institutions	187	18.4	112	19.9
Region				
East	82	21.0	55	15.5
Midwest	56	16.8	37	24.1
West	49	16.1	20	24.2
Institution Locale				
Urban	69	19.7	43	21.5
Suburban or Large Town	62	19.6	38	19.9
Rural	56	15.5	31	17.7
Institution Size				
1,000 or fewer	8	25.2	6	10.1
1,001–3,000	60	14.2	30	17.0
3,001–10,000	87	20.1	56	22.2
More than 10,000	32	20.3	20	20.7

Note. 187 of 206 responding institutions provided distance and campus-based CTE credit enrollment numbers, and 112 provided distance and campus-based CTE noncredit enrollment figures.

Table 17
Percentage Distribution of Distance CTE Credit and Noncredit Courses (2001–2002)

Distance Courses (Credit)	*n*	None	1–15	16–50	51–100	101–300	>300
All Institutions	189	2.6	39.2	36.0	14.3	7.9	0
Region							
East	82	1.2	39.0	31.7	19.5	8.5	0
Midwest	56	0	35.7	46.4	8.9	8.9	0
West	51	7.8	43.1	31.4	11.8	5.9	0
Institution Locale							
Urban	70	4.3	31.4	35.7	15.7	12.9	0
Suburban or Large Town	63	1.6	42.9	34.9	15.9	4.8	0
Rural	56	1.8	44.6	37.5	10.7	5.4	0
Institution Size							
1,000 or fewer	8	0	33.3	25.0	8.3	0	0
1,001–3,000	60	1.7	48.3	31.7	11.7	6.7	0
3,001–10,000	88	3.4	37.5	39.8	12.5	6.8	0
More than 10,000	33	3.0	24.2	33.3	24.2	15.2	0

Distance Courses (Noncredit)	*N*	None	1–15	16–50	51–100	101–300	>300
All Institutions	143	52.4	17.5	15.4	8.4	4.2	2.1
Region							
East	64	43.8	21.9	21.9	7.8	1.6	3.1
Midwest	42	47.6	16.7	14.3	4.8	11.9	4.8
West	37	68.3	10.8	5.4	13.5	0	0
Institution Locale							
Urban	54	46.3	22.2	9.3	13.0	3.7	5.6
Suburban or Large Town	48	60.4	14.6	16.7	4.2	41.2	0
Rural	41	51.2	14.6	22.0	7.3	4.9	0
Institution Size							
Less than 1,000	8	50.0	12.5	12.5	25.0	0	0
1,001-3,000	37	56.8	16.2	13.5	2.7	5.4	5.4
3,001-10,000	72	43.1	22.2	18.1	11.1	5.6	0
More than 10,000	26	73.1	7.7	11.5	3.8	0	3.8

Note. 189 of the 206 responding institutions reported the number of distance CTE credit courses, while 144 colleges reported the number of distance CTE noncredit courses. Row percentages may not add to 100 due to rounding.

Table 18
Average Number of Distance CTE Programs Offered (2001–2002)

Institutional Characteristic	*n*	Degree Programs	*n*	Certificate Programs (Credit)	*n*	Certificate Programs (Noncredit)	*n*	Licensure/ Credential Programs
All Institutions	185	2.1	185	2.3	150	1.6	148	0.8
Region								
East	80	1.7	79	1.7	68	1.3	67	0.9
Midwest	56	3.0	55	3.4	42	1.7	42	1.6
West	49	1.8	51	2.1	40	2.0	39	0
Institution Locale								
Urban	63	2.2	63	2.6	56	1.1	55	0.5
Suburban or Large Town	63	2.8	65	2.9	48	2.4	48	1.7
Rural	59	1.5	57	1.3	46	1.3	45	0.3
Institution Size								
1,000 or fewer	11	2.6	10	0.5	9	2.1	8	0
1,001–3,000	58	3.1	57	3.4	44	1.0	48	1.5
3,001–10,000	83	1.9	85	1.7	68	1.5	64	0.5
More than 10,000	33	1.6	33	2.4	29	2.5	28	0.8

Note. 185 of 206 responding institutions provided the number of distance credit degree and credit certificate CTE programs, while 150 provided the number of noncredit certificate programs and 148 provided the number of licensure/credential programs.

Table 19
Percentage of CTE Programs Offered via Distance (2001–2002)

Institutional Characteristic	*n*	Degree Programs	*n*	Certificate Programs (Credit)	*n*	Certificate Programs (Noncredit)	*n*	Licensure/ Credential Programs
All Institutions	174	7.4	173	7.1	75	9.9	80	9.1
Region								
East	78	7.6	75	5.2	42	7.9	47	10.1
Midwest	50	5.6	49	9.4	20	15.2	21	11.6
West	46	9.1	49	7.6	13	8.2	12	1.8
Institution Locale								
Urban	60	6.4	58	5.8	29	11.3	31	10.1
Suburban or Large Town	56	9.9	60	9.6	28	7.6	28	13.2
Rural	58	6.1	55	5.6	18	11.3	21	2.0
Institution Size								
1,000 or fewer	11	7.4	9	3.2	4	0	5	0
1,001–3,000	55	9.3	54	10.0	19	6.4	26	10.5
3,001–10,000	79	6.7	81	6.3	36	15.2	32	11.7
More than 10,000	29	5.5	29	5.0	16	4.6	17	4.5

Note. 174 of 206 responding institutions provided the number of campus and distance credit degree CTE programs, and 173 of 206 responding institutions provided the number of campus and distance credit certificate CTE programs; 75 provided the number of campus and distance noncredit certificate programs, and 80 provided the number of campus and distance licensure/credential programs.

Table 20
Percentage Distribution of Distance CTE Programs Offered for Degree, Certificate, and Licensure/Credential (2001–2002)

Degree Programs	*n*	None	1–5	6–10	11–15	16–25	>25
All Institutions	185	55.1	37.3	3.2	1.6	0.5	2.2
Region							
East	78	55.1	39.7	2.6	0	1.3	1.3
Midwest	56	55.4	32.1	5.4	3.6	0	3.6
West	49	53.1	40.8	2.0	2.0	0	2.0
Institution Locale							
Urban	63	49.2	39.7	7.9	1.6	0	1.6
Suburban or Large Town	63	52.4	41.3	1.6	0	0	4.8
Rural	59	64.4	30.5	0	3.4	1.7	0
Institution Size							
1,000 or fewer	11	63.6	36.4	0	0	0	0
1,001–3,000	58	56.9	34.5	0	3.4	1.7	3.4
3,001–10,000	83	54.2	37.3	4.8	1.2	0	2.4
More than 10,000	33	51.5	42.4	6.1	0	0	0

Note. 185 of 206 institutions provided the number of distance credit CTE programs.

Certificate Programs (Credit)	*n*	None	1–5	6–10	11–15	16–25	>25
All Institutions	185	54.6	37.3	2.2	0.5	3.2	2.2
Region							
East	79	64.6	27.8	2.5	0	5.1	0
Midwest	55	43.6	47.3	1.8	1.8	0	5.5
West	51	51.0	41.2	2.0	0	3.9	2.0
Institution Locale							
Urban	63	47.6	44.4	1.6	1.6	1.6	3.2
Suburban or Large Town	65	56.9	32.3	3.1	0	4.6	3.1
Rural	57	59.6	35.1	1.8	0	3.5	0
Institution Size							
1,000 or fewer	10	60.0	40.0	0	0	0	0
1,001–3,000	57	56.1	29.8	3.5	1.8	5.3	3.5
3,001–10,000	85	57.6	37.6	1.2	0	2.4	1.2
More than 10,000	33	42.4	48.5	3.0	0	3.0	3.0

Note. 185 of 206 responding institutions provided the number of distance credit certificate CTE programs.

Certificate Prog. (Noncredit)	*n*	None	1–5	6–10	11–15	16–25	>25
All Institutions	150	80.7	12.0	2.7	2.0	2.0	0.7
Region							
East	68	77.9	14.7	1.5	4.4	1.5	0
Midwest	42	78.6	11.9	4.8	0	4.8	0
West	40	87.5	7.5	2.5	0	0	2.5
Institution Locale							
Urban	56	82.1	10.7	3.6	1.8	1.8	0
Suburban or Large Town	48	75.0	16.7	2.1	4.2	0	2.1
Rural	46	84.8	8.7	2.2	0	4.3	0
Institution Size							
1,000 or fewer	9	77.8	11.1	0	0	11.1	0
1,001–3,000	44	84.1	11.4	0	2.3	2.3	0
3,001–10,000	68	77.9	11.8	5.9	2.9	1.5	0
More than 10,000	29	82.8	13.8	0	0	0	3.4

Note. 150 of 206 responding institutions provided the number of noncredit certificate programs.

Licensure/Credential Prog.	*n*	None	1–5	6–10	11–15	16–25	>25
All Institutions	148	85.5	9.5	2.7	1.4	0	0.7
Region							
East	67	83.6	10.4	3.0	3.0	0	0
Midwest	42	78.6	14.3	4.8	0	0	2.4
West	39	97.4	2.6	0	0	0	0
Institution Locale							
Urban	55	83.6	12.7	3.6	0	0	0
Suburban or Large Town	48	81.3	10.4	4.2	2.1	0	2.1
Rural	45	93.3	4.4	0	2.2	0	0
Institution Size							
1,000 or fewer	8	100.0	0	0	0	0	0
1,001–3,000	48	81.3	12.5	2.1	2.1	0	2.1
3,001–10,000	64	87.5	9.4	1.6	1.6	0	0
More than 10,000	28	85.7	7.1	7.1	0	0	0

Note. 148 of 206 responding institutions provided the number of licensure/credential programs.

Table 21
Average Number of Internet-Based CTE Courses (2001–2002)

Institutional Characteristic	*n*	Internet-Based CTE Credit Courses	*n*	Internet-Based CTE Noncredit Courses
All Institutions	185	36.0	150	67.0
Region				
East	76	32.2	62	25.5
Midwest	57	41.4	47	57.5
West	52	35.5	41	13.5
Institution Locale				
Urban	69	47.6	61	25.6
Suburban or Large Town	58	33.9	44	57.8
Rural	58	24.0	45	16.9
Institution Size				
1,000 or fewer	11	12.6	9	15.3
1,001–3,000	60	35.9	43	41.6
3,001–10,000	79	32.2	69	14.6
More than 10,000	35	51.6	29	65.7

Note. Of the 206 responding institutions that offer distance CTE, 185 provided CTE credit enrollment numbers, and 151 provided CTE noncredit enrollments for Internet courses.

Table 22
Percentage of Community College Distance CTE Courses Offered via Internet (2001–2002)

Institutional Characteristic	*n*	Internet-Based CTE Credit Courses	*n*	Internet-Based CTE Noncredit Courses
All Institutions	131	74.8	77	46.6
Region				
East	61	70.6	33	58.1
Midwest	39	75.8	27	41.2
West	31	81.8	17	32.8
Institution Locale				
Urban	48	74.3	36	43.7
Suburban or Large Town	39	78.7	19	50.0
Rural	44	71.9	22	48.4
Institution Size				
1,000 or fewer	7	76.3	5	66.0
1,001–3,000	50	75.5	20	35.5
3,001–10,000	50	73.5	40	53.6
More than 10,000	24	74.9	12	33.4

Note. Of the 206 responding institutions that offer distance CTE, 131 provided the total number of distance and Internet CTE credit courses, and 77 provided the total number of distance and Internet CTE courses.

Table 23
Percentage Distribution of Internet-Based CTE Credit and Noncredit Courses (2001–2002)

Credit Internet Courses	*n*	None	1–25	26–50	51–100	>100
All Institutions	185	4.9	52.4	22.2	13.5	7.0
Region						
East	76	7.9	50.0	23.7	11.8	6.6
Midwest	57	1.8	54.4	21.1	17.5	5.3
West	52	3.8	53.8	21.2	11.5	9.6
Institution Locale						
Urban	69	5.8	42.0	23.2	18.8	10.1
Suburban or Large Town	58	3.4	46.6	29.3	15.5	5.2
Rural	58	5.2	70.7	13.8	5.2	5.2
Institution Size						
1,000 or fewer	11	0	81.8	18.2	0	0
1,001–3000	16	6.3	62.5	12.5	0	18.8
3,001–10,000	79	5.1	54.4	22.8	12.7	5.1
More than 10,000	35	2.9	28.6	25.7	28.6	14.3

Noncredit Internet Courses	*n*	None	1–25	26–50	51–100	>100
All Institutions	151	58.9	21.9	6.6	5.3	7.3
Region						
East	62	56.5	21.0	11.3	8.1	3.2
Midwest	47	51.1	31.9	4.3	0	12.8
West	42	71.4	11.9	2.4	7.1	7.1
Institution Locale						
Urban	61	63.9	18.0	3.3	6.6	8.2
Suburban or Large Town	45	55.6	20.0	11.1	2.2	11.1
Rural	45	55.6	28.9	6.7	6.7	2.2
Institution Size						
1,000 or fewer	9	44.4	33.3	11.1	11.1	0
1,001–3,000	9	66.7	11.1	0	0	22.2
3,001–10,000	69	56.5	27.5	5.8	7.2	2.9
More than 10,000	30	66.7	10.0	6.7	0	16.7

Note. Of the 206 responding institutions that offer distance CTE, 185 provided CTE credit enrollment numbers, and 151 provided CTE noncredit enrollments for Internet courses. Row percentages may not add to 100 due to rounding.

Table 24
Percentage of Internet-Based CTE Courses Provided Through External Providers and Partnerships (2001–2002)

Institutional Characteristic	*n*	External Providers (%)	*n*	College/University Partnerships (%)
All Institutions	172	16.2	185	18.9
Region				
East	71	17.6	77	20.3
Midwest	51	14.6	59	20.0
West	50	16.0	49	15.4
Institution Locale				
Urban	68	14.9	70	18.6
Suburban or Large Town	56	16.3	60	15.2
Rural	48	17.9	55	23.2
Institution Size				
1,000 or fewer	9	23.4	12	37.3
1,001–3,000	48	22.0	57	27.4
3,001–10,000	81	14.3	82	11.8
More than 10,000	34	10.8	34	15.2

Table 25
Percentage Distribution of Internet-Based CTE Courses Provided Through External Providers (2001–2002)

External Providers	*n*	Number of Courses None	1–25	26–50	51–100
All Institutions	172	69.2	11.0	5.2	14.5
Region					
East	71	64.8	14.1	4.2	16.9
Midwest	51	76.5	3.9	5.9	13.7
West	50	68.0	14.0	6.0	12.0
Institution Locale					
Urban	68	70.6	11.8	5.9	11.8
Suburban or Large Town	56	67.9	14.3	1.8	16.1
Rural	48	68.8	6.3	8.3	16.7
Institution Size					
1,000 or fewer	9	66.7	0	0	33.3
1,001–3,000	48	68.8	4.2	6.3	20.8
3,001–10,000	81	66.7	17.3	3.7	12.3
More than 10,000	34	76.5	8.8	8.8	5.9

Table 26
Percentage Distribution of Internet-Based CTE Courses Provided through Partnerships (2001–2002)

		Number of Courses			
Partnerships	*n*	None	1–25	26–50	51–100
All Institutions	185	53.5	27.0	3.8	15.7
Region					
East	77	54.5	24.7	2.6	18.2
Midwest	59	45.8	35.6	1.7	16.9
West	49	61.2	20.4	8.2	10.2
Institution Locale					
Urban	70	60.0	21.4	2.9	15.7
Suburban or Large Town	60	51.7	33.3	3.3	11.7
Rural	55	47.3	27.3	5.5	20.0
Institution Size					
1,000 or fewer	12	41.7	8.3	16.7	33.3
1,001–3,000	57	43.9	29.8	1.8	24.6
3,001–10,000	82	59.8	29.3	2.4	8.5
More than 10,000	34	58.8	23.5	5.9	11.8

Table 27
Percentage of Technology Use in Internet-Based CTE Courses (2001–2002)

Distance Education Technology	*n*	Ranges of Technology Use				
		0%	1–25%	26–50%	51–75%	76–100%
Low-Bandwidth Technologies						
E-mail	174	2.9	1.7	1.1	0	94.3
Course Management Systems	190	4.2	2.1	4.2	5.3	84.2
Asynchronous Discussion	162	8.0	5.6	6.8	15.4	64.2
Text Chat	136	26.5	38.2	12.5	3.7	19.1
CD-ROM	142	22.5	58.5	8.5	2.8	7.7
High-Bandwidth Technologies						
Streaming Video	127	62.2	29.9	4.7	0	3.1
Streaming Audio	126	55.6	38.1	2.4	1.6	2.4
Streaming PowerPoint®	131	52.7	35.1	9.9	0	2.3
Voice Chat	117	86.3	7.7	2.6	1.7	1.7
Desktop Videoconferencing	118	83.9	15.3	0	0	.8

Note. Table indicates the percentage of responding institutions within ranges of use of a specific technology.

Table 28
Future Use of Technologies by Colleges that Currently Offer Distance CTE Courses

Technologies for Distance Learning in CTE	*n*	Decreased Use	No Change	Increased Use
Low-Bandwidth Technologies				
Course Management Systems (e.g., Blackboard®, WebCT®)	200	2.5	16.0	81.5
Internet Courses with Asynchronous Interaction	198	1.5	19.2	79.3
CD-ROM/DVD	184	2.2	20.7	77.2
Asynchronous Discussion Lists or Bulletin Boards	193	2.6	24.9	72.5
E-Mail	191	1.6	29.3	69.1
Synchronous Text Chat	164	6.7	37.8	55.5
Video/Audio Tapes	169	23.1	47.9	29.0
Fax	160	17.5	61.3	21.3
High-Bandwidth Technologies				
Streaming Media (Audio and/or Video)	177	1.7	11.3	87.0
Streaming Media Synchronized with PowerPoint® Slides	172	2.3	16.9	80.8
Internet Courses with Synchronous Interaction	185	8.1	30.3	61.6
Desktop Videoconferencing	166	3.6	37.3	59.0
Two-Way Audio/Two-Way Video	168	6.0	41.4	53.0
One-Way Prerecorded Audio	146	15.8	42.5	41.8
One-Way Prerecorded Video	153	15.7	43.8	40.5
One-Way Live Video	140	17.1	50.0	32.9
Instructional Television	162	20.4	48.1	31.5
Two-Way Audio	144	10.4	61.1	28.5
One-Way Live Audio	140	15.0	58.6	26.4

Note. Table indicates the percentage of responding institutions that projected the use of a specific technology will decrease, increase, or remain the same.

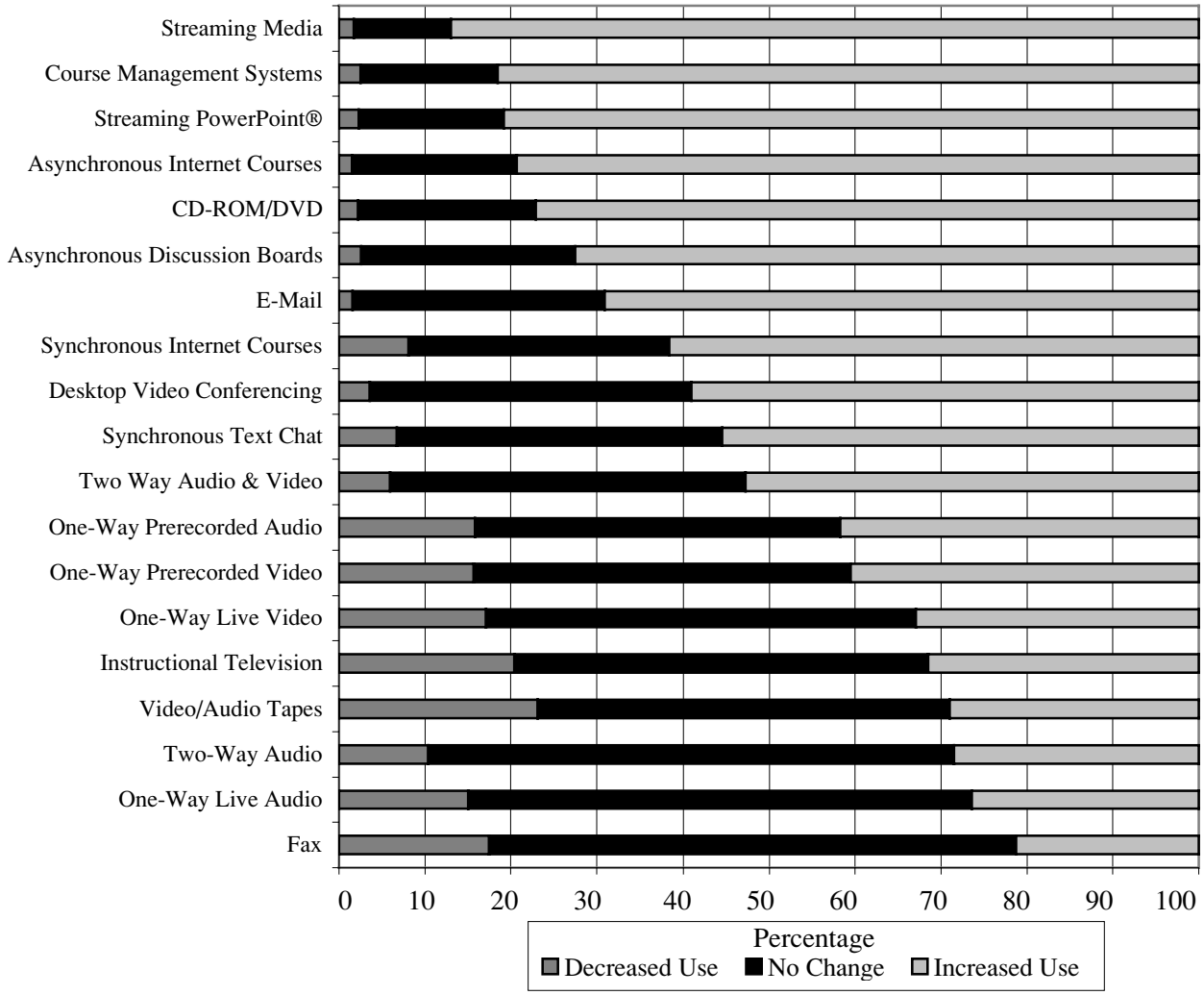

Figure 2. Anticipated increases/decreases in the use of technologies for CTE courses offered at a distance.