

Chapter 1

DISTANCE EDUCATION INITIATIVES AND THEIR EARLY 21ST CENTURY ROLE IN THE LIVES OF PEOPLE WITH DISABILITIES

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ABSTRACT

Technological advancement has broadened educational, employment and training opportunities for students and adults with disabilities via distance education. Distance education is a prized tool of K-12 and higher education, and for vocational training and research. Advancing knowledge of accessible technology and universal design concepts have coincided with the distance education movement, and with a federal mandate for accessible technology under Section 508 of the amended Rehabilitation Act. However, studies of website accessibility and universal applications designed to deliver online learning question whether these tools permit equal and effective participation by people

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with varying disabilities. Other studies of accessible virtual knowledge communities suggest needed improvements to advance the inclusion of people with disabilities in online collaborative research and training initiatives. This chapter explores the implications of the growing distance education movement for people with disabilities. First, we review the breadth of distance learning initiatives and their benefits and challenges for learners with disabilities. Second, we discuss applicable learning theory and practice, and the relevant mandates of U.S. disability laws. Third, we evaluate likely compliance on distance learning activities with disability law and propose best practices to support distance education programs for equal access and opportunity in employment, education and other areas by the widest number and variety of people.

INTRODUCTION

This chapter explores the implications of the growing distance education movement for people with disabilities. Technological advancement has broadened educational, employment and training opportunities for students and adults with disabilities and nontraditional students via distance education (Ex-Coach, 2006; Keller, 2006; Southeast DBTAC, 2005; Watson & Ryan, 2006). Distance education rapidly is becoming a prized tool of K-12 and higher education (Austin, 2007; Murray, 2006; Ryman, 2005; TSC&U, 2007a), and for vocational training (Keller, 2006; TSC&U, 2007b). There is growing popularity in strictly distance learning degree and certification programs in large part for their convenience (Mehta, 2007; TSC&U, 2007c). Enactment of the No Child Left Behind Act (2001) spurned K-12 educators to find innovative and alternative means of improving student learning and opportunities for the least successful children and those in rural or under-resourced areas (Boseman Public Schools, n.d.; Cognos, 2004; GAO, 2004; Hasten, 2004; Myhill, 2004). Distance education has become a popular approach (Watson & Ryan, 2006). Moreover, distance education is proving to be a money maker for many educational programs and the information technology (IT) firms that serve them (Mintz, 2004).

Advancing knowledge of accessible technology and universal design concepts have coincided with the distance education movement, and with a federal mandate for accessible technology under Section 508 of the amended Rehabilitation Act (Blanck, Hill, Siegel, & Waterstone, 2004). However, studies of website accessibility and applications designed to deliver online learning question whether these tools permit equal and effective participation by people with varying disabilities (NCD, 2006). A 2006 study by Myhill, Cogburn, Samant, Addom, and Blanck (in press) of accessible cyberinfrastructure-enabled knowledge communities suggests needed improvements to advance the inclusion of people with disabilities in online collaborative research and training initiatives.

In this chapter, first, the authors review the varieties and uses of distance education programs and their likely implications for learners with disabilities. Second, we explore emerging learning theory and practice for delivering distance education, best practices for instructing learners with disabilities and their civil rights to K-12 and higher education. Third, we evaluate current distance education compliance with disability law and propose

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policy initiatives and best practices for distance education programs that ensure equal access and opportunity for learners with and without disabilities.

I. DISTANCE EDUCATION AND LEARNERS WITH DISABILITIES

The unique selling point of distance learning programs is the flexibility they provide to potential students in terms of schedules and physical location (Ubell, 2000; Watson & Ryan, 2006). Distance education programs provided via mail, telephone, television, and fax services have been in existence for decades (Matthews, 1999). The mainstream proliferation of computer networks supported by high data transmission speeds in the 1980s made Computer Mediated Communication (CMC) among dispersed groups possible (Kock & Nosek, 2005). Advances in Information and Communication Technology (ICT), hardware and software systems greatly facilitate the use of the Internet to provide distance learning programs.

Today, distance learning courses utilize a range of technologies and varying degrees of access to course materials, interaction with instructors and peers, and tools to complete course requirements. K–12 and higher education recognize the inherent benefits of online learning for “promoting 21st century skills and global citizenship.” (Matthews, 1999; Watson & Ryan, p. 10). In Part I we review the varieties and uses of distance education programs and their likely implications for learners with disabilities. First we review the purposes, types, and sources of distance education programs. Second, we consider the role of distance learning in the lives of people with disabilities.

A. The Breadth of Distance Education Initiatives

Distance education has entered into nearly imaginable realm of formal and informal education, training, and certification. Traditional (i.e., brick and mortar) and virtual (i.e., online only) colleges and universities offer both matriculated courses and classes for professional development (Jung, Galyon-Keramidas, Collins, & Ludlow, 2006; NCES, 2003). Public and private companies and non-profits that specialize in a particular content, such as law, teacher education, business and research skills, offer workshops and courses to meet professional development (e.g., continuing legal education, Java enterprise development certification, human subjects training), advancement, and other criteria (Lawline.com, 2006; SkillSoft, 2007; U.S. Department of Health & Human Services, n.d.). For instance, Software application skill sets required for jobs in administrative support, publishing, accounting, payroll, software design, web design, human resources, and innumerable other positions frequently require certification in the use of specific applications (SkillSoft, 2007).

State and local education agencies, including private and charter schools offering K–12 programs, provide standard curriculum and advanced placement credit via distance learning (Watson & Ryan, 2006). While most K–12 distance programs arise from brick and mortar schools, new programs are beginning to offer only a virtual experience. Trade and technical schools that prepare students to be a dental assistant, paralegal, medical transcriptionist, home inspector, or real state salesperson among numerous other career, offer online study and examination leading to professional certification and licensure (TSC&U, 2007b). These

programs, occasionally free, can serve nearly any educational or training purpose that a student, school, employer, or public agency may have.

In this section we review the technologies involved in distance learning, possible instructional arrangements, and the purposes or goals of varying distance learning initiatives. We find these three factors are intertwined significantly, with important implications for students with disabilities.

1. Types of Technologies and Instructional Arrangements

Moore (1989) categorized three types of interactions in traditional educational programs, which are “learner-content,” “learner-instructor,” and “learner-learner” interaction. The degree to which each of these need to be facilitated in a particular distance learning program, and the desired level of interaction, are important factors in the choice of technologies and methods used to provide the learning opportunity (Parker, 1999). These programs operate on a continuum from fully synchronous (in real-time) to fully asynchronous (e.g., self-paced). Similarly, geographically distributed collaboration has three core components: people-to-people (e.g., learner-learner and learner-instructor), people-to-resources (e.g., access to datasets, shared documents, articles and meeting artifacts), and people to facilities (e.g., access to physical spaces where meetings are held) (Cogburn, 2005). The desired instructional arrangement further may dictate the necessary technologies.

Choices of technology typically are made by the instructors (i.e., preference) and their employers (i.e., what technologies the school / training provider is willing and able to use) (Sherry, 1996). In some instances, the learner may have a choice. Currently the primary technologies and emerging practices used for distance education fall into one of three activities: web-based learning, synchronous learning, and virtual reality. These categories are neither mutually exclusive, nor do they operate in isolation from one another. Many distance learning programs in the United States use a mixture of technologies to conduct distance education programs and virtual classrooms. For example, the University of Nevada, Las Vegas offered a class to train personnel in Assistive Technology using a range of applications to deliver content and host interactions through email, discussion boards, streaming videos, and live web chats (Babbitt, Thoma, & Adamson, 2002).

a. Web-based Learning

Web-based learning tools can be distinguished, in part, on the basis of their time of occurrence, that is, synchronously or asynchronously (Bafoutsou & Mentzas, 2002). Asynchronous learning opportunities are those where the human facilitator of learning does not interact with the learner in real time, and several commonly used web-based resources, such as websites and email, can be used as asynchronous educational tools (Codone, 2004). Designing web pages that host course content is a simpler means of providing asynchronous learning opportunities on the World Wide Web (“Web”). Such “static web-based educational” methodology may include linked HTML pages, presentations, and documents, among others, in a variety of formats (Codone, 2004; Poindexter & Heck, 1999).

Web-based courses offer a range of asynchronous services such as email, electronic bulletin boards, discussion forums, content management systems, mailing groups and Listservs (Hiltz & Wellman, 1997; Maher, 1999; Watson & Ryan, 2006; Zhang, Zhao, Zhou & Nunamaker, 2004). Several commercially available web based course management tools,

such as the Blackboard suite of products, WebCT,¹ and Lotus Notes, facilitate the delivery of course content and student submissions in multiple formats (Lewis, MacEntee & Youns-Maher, 2002; Storey, Phillips, Maczewski & Wang, 2002). These tools include a range of features allowing instructors to make content materials available, such as posting linked HTML documents, and uploading documents and presentations in multiple formats (e.g., Word, PDF, PowerPoint) (Lewis, et al.). In addition, they facilitate student assessment activities through the capability of developing online quizzes and tests, conducting student surveys, supporting assignment and paper submissions, and providing comprehensive gradebook tools (Blackboard, Inc., 2004; Storey, et al.). Most course management tools, such as Blackboard, allow instructors to set up online and face-to-face class discussions promoting interaction between students, and include multi-media capabilities that offer an instructor broad flexibility in the organization of a virtual classroom (Babbitt, 2003).

Open source applications increasingly provide content management systems where students can collaborate asynchronously. For instance, two IT Works² research projects at the Burton Blatt Institute—which address the (i) design of accessible open source business applications and (ii) effective accommodations for employees with disabilities in media industries—use Google Docs & Spreadsheets (2007) to share and edit common evolving documents (e.g., methods, findings) among the eight graduate student researchers. This enhances regular faculty supervision, feedback, and direction of student work.

b. Synchronous Online Education Using Multimedia

Synchronous learning permits geographically distributed real time interaction, discussion, instruction, and demonstration among students and between students and the instructor. The tools of synchronous programs may include Web casts, Web conferencing, text messaging, application sharing, and others (Watson & Ryan, 2006). Web casts involve broadcasting audio and video files over the Internet using data streaming, allowing viewers to hear, view, and read data as it is being downloaded (Locatis, 2003). An advantage of Web casts is the ability to broadcast in real time with simultaneous archiving for downloads on demand (Locatis; Rowe, Harley, Pletcher & Lawrence, 2001; Xu, Fountain, MacArthur, Braunstein & Sooriaramurthi, 2004). This provides a medium to record live in-class sessions for immediate broadcast or asynchronous access to (i.e., replaying) virtual classroom sessions (Xu, et al.; Rowe, et al.). Web casting systems such as BIBS, the Berkeley Internet Broadcasting System, also are able to stream videoconferences (Locatis, 2003). While Web casts traditionally were viewed as one-way technology, developments in infrastructure and network systems have led to increasingly interactive Web casts with integrated messaging capabilities, means to submit questions to presenters, and facilitation of simultaneous audio transmissions (Baecker, 2002; Schick, Kilgore, & Baecker, 2004).

Similarly, Web conferencing technologies have grown vastly more user-friendly, less expensive, and robust (Osborn, 2005; Whitehead, 2005). These applications may integrate instant (i.e., text) messaging, Voice and Video over Internet Protocol, application sharing, an interactive whiteboard, uninterrupted streaming regardless of bandwidth, and digital recording. Stand alone instant messaging applications such as AIM, Yahoo Messenger, MSN

¹ Blackboard and WebCT, previously supplied by independent companies, have merged under the Blackboard banner (CITE).

² IT Works is funded by the National Institute for Disability and Rehabilitation Research (U.S. Department of Education), Grant No. H133A011803.

Messenger, and ICQ commonly offer address books and filtering tools, allow users to share files and data, and support Voice and Video over Internet Protocol conversations. Similarly, instant messaging programs are embedded into course management tools such as Blackboard (2004) and web conferencing tools such as Elluminate (2006). Recently academic libraries have started offering instant messaging reference services in addition to email and web-based forms (Foley, 2002).

c. Virtual Reality

Virtual reality simulations, traditionally delivered through desktop applications with the help of special devices such as goggles and gloves, immerse the user in a 3-d virtual world (Samant, Myhill, & Blanck, 2006). Virtual reality simulations also can be delivered remotely to students who cannot be in the physical location of the equipment (Park et al., 2001). Tele-immersion applications seek to merge audio and video conferencing with virtual reality environments (Leigh, 1999), to provide a collaborative space for individuals in remote locations to interact and work with each other in virtual worlds (Mortensen, et al., 2002). Motion capture avatars and annotations are capable of recording each user's head and hand gestures, full body motion and voice, and other users can view these avatars using their own immersive technology (Lee, Ghyme, Park, & Woh, 1998; Mortensen et al. 2002). This allows multiple users, in remote locations, to interact and work with each other through their avatars.

These tools are being used in several distance learning programs. For instance, the University of Illinois at Chicago and Central Missouri State University (CMSU) held a collaborative class in which students were introduced to the culture and people of Harlem through a virtual reality application called "Virtual Harlem" (Park, et al., 2001). Students recorded their opinions and actions in virtual reality through annotations that were saved and could be retrieved later. Different exercises such as allowing a group of students to explore Virtual Harlem together and allowing others to observe their actions through their avatars, permitted students at different locations to explore this recreation of Harlem in a collaborative manner.

2. Providers of Distance Education

Providers of distance learning opportunities arise in a number of ways, such as driven by an institutional mission, mandated by a legislative body, or selected to serve a financial incentive (NCES, 2003; Watson & Ryan, 2006). These services, in large part, frequently are provided to reach and meet the needs of a broader, more diverse audience. This audience may have challenges accessing the services because of physical location, absence of transportation, expense, or special learning needs, among other factors, or simply may prefer the convenience of not having to leave home (NCES, 2003; Watson & Ryan, 2006). Large providers of distance education include traditional colleges and universities (both public and private), state and local K-12 education agencies, trade and technical schools, and software or business skill certification programs (NCES, 2003; SkillSoft, 2007; TSC&U, 2007b; Watson & Ryan, 2006).

Federal and state agencies, their contractors, and the research groups they fund increasingly use distance education tools for training, certification, or enhanced research collaboration. For instance, the Institute for Food Laws and Regulations (2006) at Michigan State University provides online training to earn the 'International Food Law Internet

Certificate.' The U.S. Department of Health and Human Services (n.d.) offers online training using asynchronous streaming audio and video media including closed captioning, for healthcare providers to acquire essential knowledge for the protection of human subjects. The Southeast Disability and Technical Assistance Center (2007) funded by the National Institute for Disability and Rehabilitation Research (U.S. Department of Education) offers a variety of online educational tools largely targeting employers and business owners and providing continuing education credits in matters regarding rights and responsibilities under the Americans with Disabilities Act.

Notably, in 2004 the U.S. Department of Education published its policy recommendations for use of the Internet and advancing technologies to improve public education. Among the recommendations was "Support E-Learning and Virtual Schools," wherein the Department acknowledged:

In the past five years there has been significant growth in organized online instruction (e-learning) and "virtual" schools, making it possible for students at all levels to receive high quality supplemental or full courses of instruction personalized to their needs. Traditional schools are turning to these services to expand opportunities and choices for students and professional development for teachers. Recommendations for states, districts and schools include:

- Provide every student access to e-learning.
- Enable every teacher to participate in e-learning training.
- Encourage the use of e-learning options to meet *No Child Left Behind* requirements for highly qualified teachers, supplemental services and parental choice.
- Explore creative ways to fund e-learning opportunities.
- Develop quality measures and accreditation standards for e-learning that mirror those required for course credit. (U.S. Department of Education, 2004, pp. 41-42).

Watson and Ryan's (2006) comprehensive review of K-12 distance education initiatives found 38 states have adopted "state-led online learning programs, significant policies regulating online education, or both." (p. 6). These programs take many forms, including 1) a unit of the state education agency or board of education (e.g., Idaho Digital Learning Academy, Illinois Virtual High School), 2) an independent entity created by the state (e.g., Colorado Online Learning), 3) a separate school district (e.g., Florida Virtual School), 4) a unit of a state university (e.g., University of California College Prep, 5) cooperatives that operate in multiple states (and countries) with membership in the hundreds of schools,³ 6) state led yet privately funded schools (e.g., Louisiana Virtual School), 7) and multiple charter schools (such as in Minnesota, Kansas, and Pennsylvania), among others (Watson & Ryan, 2006). They also range significantly in size, such as from 600 students (Hawaii E-School) to 68,000 students (Florida Virtual School) (Watson & Ryan, 2006).

Business skills training courses, such as the more than 2,000 offered by SkillSoft (2007), range comprehensively across the IT, business, desktop, legal compliance, environmental and occupational safety, and financial skill areas, and are among the more well-established and lucrative distance education initiatives. Rapidly growing is the number of providers offering

³ Virtual High School, Inc. (2007) has a membership of 457 schools, including one-third of Massachusetts' high schools, and serves over 9,000 students worldwide (Watson & Ryan, 2006).

college degree programs solely via the web (TSC&U, 2007a), however, on occasion raising questions of quality. The University of Phoenix, a network of small brick and mortar campuses in 39 states, though doing the majority of its teaching online, is in federal court responding to allegations “of fraudulently obtaining hundreds of millions of dollars in financial aid,” and has come under fire for a 16% graduation rate, racing students through course work, “and instructional shortcuts, unqualified professors and recruiting abuses.” (Dillon, 2007).

B. Benefits and Concerns for People with Disabilities

A 2006 United Nations Global Audit of Web Accessibility, in part, concluded:

The Internet is the most vital tool to emerge in the last 50 years for enhancing the lives of people with disabilities. It offers unprecedented access to information and services, overcoming many of the obstacles that people with disabilities previously experienced. It should be easier to shop online than choose clothes from a retail outlet that you can't see. It ought to be easier to bank online than manoeuvre a wheelchair up the steps to the bank building. It must be possible for people with disabilities to get online, because otherwise society will suffer (United Nations, 2006a, pp. 19-20).

For the more than 20 million working age adults with disabilities, 15 million children with disabilities, and the millions of students attending any one of the 10,793 public schools (11.9% of all public schools) failing to make “adequate yearly progress” for two consecutive years,⁴ distance education may offer hope that an affordable choice or alternative is available to facilitate their academic, technical, or professional achievement necessary to live independent and self-determined lives (Blanck & Myhill, in press; NEA, 2006; RRTC, 2005). In 2001, 48 percent of U.S. two- and four-year colleges and universities (both public and private) received requests for accommodations by persons with disabilities seeking to take their distance education courses. Larger and public institutions received more requests than medium/smaller and private institutions, respectively (NCES, 2003).

Individuals with disabilities may have the most to gain from effective distance learning opportunities. Research consistently finds fewer successful outcomes for children with disabilities as they age through K-12 education and transition into the adult world. For instance, just 50% of all students with disabilities served under the IDEA graduate from high school (U.S. Department of Education, 2006). Transition planning, mandated by the Individuals with Disabilities Education Act (IDEA) for students ages 16 and older who receive special education services (20 U.S.C.A. § 1414(d)(1)(A)(i)(VIII)), frequently lacks relevance, is poorly implemented or ineffective (NCD, 2000a; 2000b). During the two years following high school graduation, 5.7% of students with disabilities attend a 4-year college compared to 28.3% of their peers without disabilities (Wagner, Newman, Cameto, Garza, & Levine, 2005). Educational achievement and rates of employment for people with disabilities

⁴ Adequate Yearly Progress is determined by applying state-defined “high standards of academic achievement” that are “statistically valid and reliable” to evaluate whether all students and specific sub-groups of students (e.g., economically disadvantaged students, major racial and ethnic groups, students with disabilities, and English language learners) are making “continuous and substantial improvement.” (20 U.S.C.A. § 6311(b)(2)(C)).

remain low compared to people without disabilities. For instance, in 2004 people with disabilities were less than half as likely to earn a bachelors degree (12.7% vs. 29.8%) and to be employed (38.3% vs. 78.6%) (RRTC, 2005). Moreover, following secondary education, services for people with disabilities become fragmented, significantly diminish in scope and availability, overly target low paying jobs, and pose social and physical barriers (Gill, 2005; NCD, 2003; Paul, 2000; Rao, 2004; Zaslow, 2005).

Much like school choice and voucher programs, distance education is susceptible to significant criticisms or drawbacks: 1) inconsistent or unproven effectiveness and accountability, 2) intentional or inadvertent “creaming” (i.e., selection of students), 3) the absence of teacher preparation and professional development standards for the unique environments of distance education, and 4) the national shortage of highly trained special education teachers (Myhill, 2004; Watson & Ryan, 2006).

Barriers to the accessibility of technologies are caused largely by three categories of problems: technical, design, and intrapersonal barriers (Wimberly, Reed, & Morris, 2004). Technical barriers occur because of either limitations in hardware (e.g., lack of computer memory) or because of a user's lack of knowledge about a technology's usage (e.g., no alternative strategies when an application does not work as expected). Design barriers occur when applications lack design characteristics that will make information accessible. For example, the most common barrier to university web pages is the lack of alternative text for images (Schmetzke, 2002). Intrapersonal barriers occur when the learning environment does not meet the needs of individual learner characteristics. For example, a two-hour web conference may tax the stamina of a person with chronic fatigue syndrome.

Barriers inherent in the design of distance learning technologies specifically may exclude individuals with varying impairments from success in these programs. We have found that “persons with vision, hearing, fine motor, or cognitive impairments, and learning or attention difficulties … experience the greatest barriers to effective communication when technologies demand multi-sensory interaction (e.g., unimpaired hearing, vision, attention, and fine motor skills), or permit limited forms of input/interaction (e.g., speech without closed captioning, or mouse without keyboard access) (Myhill, et al., in press). Similarly, a 2006 report sponsored by the United Nations concluded there is global failure to provide the most basic level of web accessibility to people with disabilities (United Nations, 2006c). Of the 100 websites used in the study, selected from leading websites in 20 countries, most did not meet Web Content Accessibility Guidelines (WCAG) 1.0 (W3C, 1999), widely regarded as the premier international standard (W3C, 2006).

Another study by investigators with the Southeast Disability and Business Technical Assistance Center (2006) identified four factors impacting the distance learning experiences of college students with disabilities: instructor characteristics, learner characteristics, design barriers, and factors affecting systems change. One project found that many students with disabilities, specifically students with learning disabilities, had very limited computer skills (Southeast DBTAC, 2006). Similarly, instructors differ significantly in their level of computer literacy. Investigators at four universities discovered that many faculty members had limited experience using a computer, let alone with designing accessible web pages or on-line courses (Southeast DBTAC, 2006; University of Florida, 2007).

Faculty and staff instructors may have little or no familiarity with the access needs of students with disabilities. At Blue Ridge Community College, a majority of instructors attending a workshop on web accessibility did not grasp even the most basic concepts of web

accessibility (Southeast DBTAC, 2006). Similarly, when 98 individuals representing higher education institutions in eight Southeast states attended a one-day conference on web accessibility, the conference was their first exposure to the information access and technology needs of students with disabilities—despite the fact that almost 90% of participants were disability services coordinators, specialists or directors (Babbitt, 2003). Another project discovered that many instructors had no knowledge or experience with students who had disabilities, nor did they have any idea how to provide reasonable accommodations within the classroom, in on-line courses, or in testing (Blue Ridge Community College, 2004).

Direct one-for-one transfer of course materials into on-line format may create significant access barriers for students with disabilities (Southeast DBTAC, 2006). Investigators at East Tennessee Technology Access Center found that students with physical disabilities often find writing difficult or extremely time consuming, making tests requiring a great deal of writing very difficult for them. Obtaining buy-in from key educational administrators and other key stakeholders is a significant challenge to the successful adoption and implementation of policies and practices to ensure the accessibility of distance learning opportunities (Southeast DBTAC).

II. THEORY, LAW AND PRACTICE

Since the early 1990s the Internet has evolved into a major medium for communication, enabling learners to communicate at great distance in real time, or nearly real time. This evolution has corresponded with a concurrent evolution in research about learning and a rethinking of learning theory, which affects how accessibility of online learning can be perceived and approached in online learning environments. As new theories and learning practices emerge, we must test and apply them to the learning needs of all people, including those with atypical learning needs, and especially to those with disabilities. In this part, we discuss applicable social learning theory and practice emerging in the field of distance education, the relevant federal laws addressing the rights of persons with disabilities to effective distance learning opportunities, and appropriate educational services and programs for learners with disabilities.

A. Social Learning Theory and Practice in the Distance Education Age

Social learning theories have had a profound effect on online learning. In these theoretical frameworks, learning is not perceived as the acquisition of a static repository of a domain of information. Instead, it is perceived as the product of individual experience as constructed from immersion in a culture (Schenker & Scadden, 2002). The ability to create a knowledge structure, to define problems, and to locate needed information to address those problems are more valuable skills for students than learning a static database of information. The teacher is no longer the repository and source of information. A teacher's responsibility, then, is less as a lecturer and more as a coach, who supports and encourages students throughout their learning process (Bruner, 1996). As Brown & Gray (1995) state, "Learning is less about absorbing information than it is about becoming a part of a community." (p. 78).

1. Online Learning Environments

Online learning environments are communication platforms that allow students to contribute to discussions and reach common understandings and shared meanings in the context of the environment (Brown, Collins, & Duguid, 1989). As students come to understand the culture of the domain by interactivity in class discussions and activities that support multiple perspectives, and as they practice using the tools of the domain, continuing their collaboration with other learners, they reflect on the concepts they've encountered and how these concepts apply to practice. Eventually they arrive at a situated understanding of how to function in the domain (Woodfine, Nunes, & Wright, *in press*). For example, students who are learning about the concepts and theory of research methods, may discuss the issues using a collaborative discussion board and practice combining and reframing their ideas through projects and papers, and then receive feedback from faculty and peers. Eventually they arrive at a deep, practical understanding, a constructed knowledge of particular research methods and a theoretical schema for research methodologies in general.

Online communities where learners share knowledge that they care about are sometimes referred to as communities of practice. Communities of practice have three components: 1) domain, 2) community, and 3) practice (Wenger, McDermott, & Snyder, 2002). The domain is the content that brings people together in a community, motivates them, and defines the boundaries and values of the community. The community sets the tone for its members by creating respect, trust, and a sense of belonging and by providing an atmosphere in which individuals can share ideas and question assumptions. The practice is the “set of frameworks, ideas, tools, information, styles, language, stories, and documents that the community members share. ... [and] the specific knowledge the community develops, shares, and maintains.” (Wenger, et al., p. 29). When these elements function well together, the community becomes a knowledge structure, “a social structure that can assume responsibility for developing and sharing knowledge” (Wenger, et al., p. 29).

For a community of practice to function, it must embrace a diverse membership (Wenger, et al., 2002). Such communities often cross cultural boundaries. Membership may come from different nations, regions, socioeconomic classes, corporate entities, and other cultural divisions, including differing levels of ability. Although this diversity can cause misunderstanding and conflict, a community of practice that supports a diverse membership allows fertile ground for differing ideas, innovative ways of thinking about the issues people care about, and a higher level of member commitment and participation (Wenger, et al.). To enhance their value to members, communities should also provide opportunities for differing levels of participation, so that members have the option to shape their participation according to their needs, abilities, and interests (Wenger, et al.).

2. Computer-Mediated Communication

According to Tu (2005), computer-mediated communication (CMC) provides a platform upon which a community's knowledge structure can exist. To achieve successful communities of practice, three critical areas of collaborative technologies should be considered: personalization, digitization, and interactivity. Personalization describes how individuals selectively present themselves in an online environment. CMC technologies allow varying levels of participation and types of technologies. Learners can connect briefly and frequently using mobile technologies or for long durations using a standard wired Internet

connection). Unique CMC factors that affect personalization include: 1) synchronicity versus asynchronicity, where learners can communicate in real time or according to their own schedules, and 2) communication channels, which include text, audio, and video (Tu).

Personalization allows people with disabilities to present themselves in ways they feel comfortable (Tu, 2005). For instance, people with sensory impairments, who may take longer than others to access, process, and respond to information, can use asynchronous communication to provide them the time to collaborate with others comfortably. For example, learners with visual impairments can use a screen reader to access asynchronous, text-based information from a bulletin board. Learners with learning disabilities who may not be able to respond quickly in writing to others in a learning community can take the time to edit their writing, use a spell checker, and submit their response asynchronously, or they may choose the use of a live video stream synchronously to speak their ideas, rather than rely on the written word.

Digitization of content allows higher quality information to be available at increasingly faster transmission speeds. Digitization continually increases access to information in new ways (Tu, 2005). For example, higher quality audio and video are becoming more available in their creation, distribution, and access, and access to this information is becoming more possible via wireless and handheld devices, making quality information available to individuals more ubiquitously. For people with disabilities, improvements in digital technologies help the conversion of quality information to different sensory modalities and provide easy ways to create and access this information (Tu). For example, voice recognition systems increasingly are more robust, allowing people to convert their words to digital text more accurately with less effort. Realtime captioning is more easily provided to users of video chat or conference rooms to enable individuals with hearing impairments to participate more actively in synchronous classrooms.

Interactivity provides learners the ability to engage in real collaboration in learning environments through two-way communication. A learning environment affords four types of interaction: learner – instructor, learner – content, learner – learner, and learner – interface (Tu, 2005). This interactivity allows learners to provide input into the knowledge base of the learning environment, which is stored and made available to others for further interactivity and for reference. The interactive processes of sharing, retrieving, validating, and managing both new and archived knowledge (Tu) create an environment where the community synergistically helps its members acquire useful and meaningful information and skills.

3. Adaptable, Accessible and Universal Design

For CMC to create successful communities of practice, the technology must permit use by a diverse learner population, which includes people with disabilities. To understand how technologies can be made accessible, designers, developers, and content providers of the technologies should understand the distinction between adaptable design, accessible design, and universal design. Technologies that are adapted to meet the needs of specific populations, or even individuals, are less desirable than other designs because they can be expensive, time-consuming, and idiosyncratic. Technologies designed to be accessible provide content that can be accessed using assistive technologies, such as screen readers, and are more generally available to a wide audience. However, universally designed technologies are designed to be always accessible and can be used universally without the use of assistive technologies (Mace, 2007; Seale, 2007).

Thus, universally designed technologies provide a much higher likelihood that they can be used efficiently and effectively by a diverse population. For building a community, where all individuals feel included and are full participants, adapted designs and accessible designs are based on the assumption that at least two different populations are present, those with disabilities (the abnormal) and those without (the normal), which can create a stigmatizing effect. On the other hand, a universally designed technology assumes a single, continuous, but diverse community, representing different characteristics and abilities (Iwarsson & Stahl, 2003). The equalizing effect of this assumption promotes equal participation among participants in a community of practice.

B. Disability Law and Policy

Landmark disability civil rights laws in the United States ushered in new eras of rights for people with disabilities, and the recognition that “[d]isability is a natural part of the human experience [that] in no way diminishes the right of individuals to participate in or contribute to society.” (IDEA, 2005, §1400(c)(1)). Moreover, people with disabilities have the right to enjoy independent and self-determined lives, “pursue meaningful careers, [and] enjoy full inclusion and integration in the economic, political, social, cultural, and educational mainstream of American society” (Rehabilitation Act, 2000, 29 U.S.C. § 701(3)).

Nearly three decades after the earliest of these laws (i.e., the Rehabilitation Act of 1973), in passing the Americans with Disabilities Act of 1990 (ADA), Congress found that

individuals with disabilities are a discrete and insular minority who have been faced with restrictions and limitations, subjected to a history of purposeful unequal treatment, and relegated to a position of political powerlessness in our society, based on characteristics that are beyond [their] control ... and resulting from stereotypic assumptions not truly indicative of the individual ability ... to participate in, and contribute to, society (ADA, 2000, 42 U.S.C. § 12101(a)(7)).

These laws, however, did not foresee the technological advances of the Internet, or the dramatic increase in distance education initiatives via the Internet. Not until the 1998 amendments to the Rehabilitation Act did laws seriously contemplate Internet accessibility. In this section, we review applicable U.S. federal and state laws, and the United Nations 2006 Convention on the Rights of Persons with Disabilities.

1. The Americans with Disabilities Act of 1990

A key goal of the Americans with Disabilities Act of 1990 (ADA) was to tear down the physical and social barriers to equal opportunity for, and the full integration of, individuals with disabilities throughout society (Blanck, et al., 2004). Titles II and III, which apply to public and private post-secondary education and training schools, respectively, have obligations to remove these barriers.

Barriers take many forms and impede not merely physical access (e.g., a hotel room or public restroom), but access to meaningful communication (e.g., telephone, television, email, or lecture), participation (e.g., in a classroom, board room, or parent-teacher or community

association meeting), and benefit of programs and services (e.g., enrolling for social security benefits, healthcare coverage, or university course) (Myhill, et al., in press; ADA, 42 U.S.C. § 12101).

ADA title II requires state and local governments ensure they do not exclude qualified persons with disabilities from their programs, services, and benefits by reason of disability (ADA, 42 U.S.C. § 12132). For instance, title II requires the accessibility of state and local government web sites. In *Martin v. Metropolitan Atlanta Rapid Transit Authority* (2002), a federal district court in Georgia concluded that bus and transit service scheduling information on the MARTA website must be accessible to persons who are blind. When a student with a disability “meets the essential eligibility requirements” for participation in or receipt of the services of state- or locally-operated universities, colleges and trade schools, the school cannot turn the student away (ADA, §§ 12131(2)–12132). Moreover, in a letter from Adriana Cardenas in the Office for Civil Rights (OCR), to the President of California State University at Los Angeles, Cardenas indicated that title II:

requires a public college to take appropriate steps to ensure that communications with persons with disabilities ‘are as effective as communications with others’ OCR has repeatedly held that the term ‘communication’ in this context means the transfer of information, including (but not limited to) the verbal presentation of a lecture, the printed text of a book, and the resources of the Internet (U.S. Department of Education, 1997; see also 28 C.F.R. § 35.160(a)).

Public colleges and universities have an “affirmative duty” to: 1) “make reasonable modifications to policies, practices, and procedures,” 2) administer services in the “most integrated setting appropriate,” 3) remove architectural, communication, and transportation barriers, and 4) provide necessary auxiliary aids and services to ensure students with disabilities have opportunities equal to that of peers without disabilities to receive services and participate in programs and activities (Blanck, Hill, Siegel & Waterstone, 2005, p. 345; *Delano-Pyle v. Victoria County*, 2002; 28 C.F.R. § 35.160(b)(1)). For instance, a state college needs to provide alternative (e.g., text to speech, Braille) formats of course syllabi, applications, school rules, course directories, and signage to ensure a student who is blind can enjoy, comply with, and contribute to the college’s programs and services. The title II entity, however, does not have to make “modifications [that] fundamentally alter the nature of its service, program, or activity” (U.S. Department of Justice, n.d., § II-3.6100).

One notable difficulty for ADA plaintiffs under title II is the right of the States to claim sovereign immunity to suit by its citizens. The courts have agreed with States that the ADA does not constitutionally abrogate their sovereign immunity, except when an agent of the state has violated a constitutional right of the plaintiff (*Tennessee v. Lane*, 2004; U.S. Constitution, Amendment XIV, §§ 1 & 5; U.S. Constitution, Amendment XI). Some states have passed laws codifying the ADA and implying their own abrogation of sovereign immunity. Arizona and Virginia, for instance, have incorporated the title II standards of the ADA into their statutes, and imply the State may be sued if it engages in practices prohibited by the ADA (Arizona Revised Statutes, 2006, § 41-1492.06; Virginia Code Annotated, 2006, § 51.5-46). The majority of States have not incorporated the ADA within their statutes.

The mandate off § 504 of the Rehabilitation Act, which prohibits the same discriminatory conduct by “any program or activity receiving Federal financial assistance,” (29 U.S.C. §

794) also may be invoked as title II institutions of higher education commonly receive Federal funds for student aide, and in support of Pell and research grants (Miller v. Abilene Christian University of Dallas, 1981; see also Tyndall v. National Education Center of California, 1993). Likewise, title II and § 504 are applicable to the programs and services of public schools (K–12), that is, title II as a local government agency and § 504 as a recipient of Federal IDEA funds (Sandison v. Michigan High School Athletic Association, Inc., 1994). Qualified students with disabilities may not be denied equal access to and the benefit of these programs and services.

Private colleges, universities, trade schools, and businesses may not deny a student with a disability the full and equal enjoyment of their services and facilities on the basis of disability (ADA, 42 U.S.C. § 12182(b)(1)(A)(i)). ADA title III requires “public accommodations” (e.g., cinemas, department stores, restaurants, and other entities with operations that affect commerce) ensure students with disabilities have “full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations.” (ADA, § 12182(a)). Title III entities specifically include private nursery schools, elementary and secondary schools, colleges and “other place[s] of education.” (ADA, § 12181(7)(J); Guckenberger v. Boston University, 1997). Title III discrimination includes the “failure to make reasonable modifications in policies, practices, or procedures” to accommodate a student with a disability, unless the school demonstrates that modifications would “fundamentally alter” the nature of their services (ADA, § 12182(b)(2)(A)(iii)).

Although it is not settled federal law whether public accommodations offering services via the World Wide Web are subject to ADA requirements, the evolving majority position indicates persons with disabilities cannot be excluded from their web-based services if the title III entity has a permanent physical location (Blanck, et al., 2004). The Eleventh Circuit Court of Appeals, for instance, found that Congress intended ADA title III to apply to public accommodations with a “physical concrete” presence and not solely a virtual presence (Access Now, Inc. v. Southwest Airlines, 2002, p. 1319).

2. Section 508 of the Rehabilitation Act

Section 508, enacted through the Workforce Investment Act of 1998, requires electronic and information technologies (E&IT) used by employees of the federal government who have disabilities, and utilized to provide federal services to persons with disabilities, are accessible (29 U.S.C. § 794(a)(1)(A) (2000)). These products and services include federal websites, telecommunications, software, information kiosks, transaction machines, multimedia, office equipment, and others (Access Board, 2005, 36 C.F.R. §§ 1194.4, 1194.21–.26). Additionally, Federal agencies may not “develop, procure, maintain, or use” E&IT that is not comparably accessible to persons with and without disabilities, unless accessibility would pose an undue burden upon the agency (Access Board, 36 C.F.R. § 1194.1).

Though § 508 does not apply to title II or title III entities, several states have adopted similar standards, in part to comply with title II, impacting the accessibility of state and local government agency products, programs, and services for employees and members of the public with disabilities (ITTATC, 2003; 2006). The State of Indiana, for instance, passed legislation directing the Indiana Office of Technology (IOT) to develop standards that comply with § 508, and which apply to all branches of state and local government (Indiana Code, 2006 § 4-13.1-3(1)(a), (d)). The standards developed require the accessibility of “IT

equipment, software and services" including "all web pages hosted by or for the state." (IOT, 2005, p.1).

Similarly, the State of North Carolina enacted the Persons with Disabilities Protection Act, which prohibits state and local government from denying "the full and equal enjoyment of the goods, services, facilities, privileges, advantages, and accommodations ... on the basis of a disabling condition." (North Carolina General Statutes, 2006, § 168A-6). Statute further directs the Office of the State Chief Information Officer (OSCIO) to develop and implement standards for web portals that "allow persons to access State government services on a 24-hour basis." (North Carolina General Statutes, § 66-58.20(a)). The OSCIO (2005), in turn, produced Standard 2.2.1 requiring state government full compliance with Priority 1 of the World Wide Web Consortium's Web Content Accessibility Guidelines, and Practice 2.1.9 recommending that E&IT is accessible "to the broadest possible range of users and compatible with a wide range of assistive technologies."

3. The Individuals with Disabilities Education Act

Before the 1970s, half of all U.S. children with disabilities were warehoused in state institutions, commonly offering squalid conditions and no educational opportunity (Blanck & Myhill, in press). Since 1975, the Individuals with Disabilities Education Act⁵ has entitled children with disabilities to a free and appropriate public education (FAPE), provided in the least restrictive environment, including the necessary individualized educational and related services, and specialized instruction to provide educational benefit (Blanck & Myhill, in press; Myhill, 2004). Students eligible for and receiving special education services comprise 14% (or 6.6 million) of all children in U.S. schools (NCES, 2006). Children are eligible for IDEA services if identified as requiring special education or related services due to a specific learning disability, autism, a hearing or visual impairment, traumatic brain injury, an orthopedic impairment, a speech or language impairment, mental retardation, serious emotional disturbance, or a health impairment⁶ (IDEA, 2005, 20 U.S.C.A. § 1401(3)(A)(i)-(ii)).

Like children without disabilities, those with special needs largely are capable of academic and social achievement, high school graduation, and post-secondary education, training, and employment (CITE). In passing the ADA, Congress found that "the Nation's proper goals regarding individuals with disabilities are to assure equality of opportunity, full participation, independent living, and economic self-sufficiency." (ADA, 2000, 42 U.S.C § 12101(a)(8)). Facilitating these achievements for children with disabilities, however, requires specialized instructional methods, strategies, and materials, highly qualified special education teachers, and effective transition planning. In section C below, we discuss best practices for educating children and adults with disabilities in light of these legal mandates.

Central to these services is the annual development of an individualized education plan (IEP) (Myhill, 2004). Specifically, the IEP (1) identifies the child's present competencies and needs; (2) articulates measurable goals and short-term objectives to remediate the needs; (3) designates specialized services, modifications, supports, and supplementary aids to implement

⁵ Formerly the Education for All Handicapped Children Act (1975), the Act was renamed the Individuals with Disabilities Education Act (IDEA) in 1990 (Katsiyannis, Yell, & Bradley, 2001). The Individuals with Disabilities Education Improvement Act of 2004 is the latest reauthorization of the IDEA.

⁶ Health impairments are "chronic or acute health problems" causing "limited strength, vitality or alertness" and which "adversely affect ... educational performance." (34 C.F.R § 300.8(c)(9), 2006).

the goals and objectives; and (4) determines the least restrictive environment(s) (LRE) in which services will be provided (Myhill, 2004). Online distance learning services provided by state or local education agencies to students receiving special education services must conform to the individual child's IEP. Yet distance learning may pose significant accessibility barriers. Moreover, such services will run afoul of the FAPE mandate if inaccessibility impedes educational benefit or imposes costs on the family such as having to purchase assistive technologies, or if the services remove the student from the least restrictive or impose a more restrictive environment.

4. The 2006 Convention on the Rights of People with Disabilities

On December 13th, 2006 the United Nations adopted a new treaty aimed to protect and promote the human rights of people with disabilities (United Nations, 2006b). The Convention on the Rights of Persons with Disabilities (2007) (hereinafter CRPD or "Convention") does not create new rights but specifically prohibits discrimination against people with disabilities in all areas of life. It opens for signature and ratification by Member States on March 30, 2007 (United Nations Office of Legal Affairs, 2007). Once twenty countries ratify the Convention, it will enter force, leading to new obligations for State Parties (Convention, art. 45, § 1).

The adoption of the Convention highlights a new focus on ensuring access, a precept that has evolved into a fundamental principle for human rights and development. Among other provisions, the CRPD contains measures making goods, services, and facilities accessible to persons with disabilities (Convention, 2007, art. 4, § 1(f)). Particularly, it requires that Information and Communications Technology (ICT) be accessible to people with disabilities (Convention, art. 4, § 1(g)). Before the Convention on the Rights of Persons with Disabilities, human rights treaties did not include an explicit reference to new technologies. By mandating ICT accessibility, the CRPD is reaffirming that disability rights and ICT are inextricably linked and, at the same time, acknowledging ICT accessibility as a human rights issue. In virtue of the Convention, States Parties are obligated to establish structures to support its principles. Moreover, for each State Party to the Convention the failure to ensure ICT accessibility will be considered a violation of the principle of non-discrimination. There are a few convention sections specifically addressing ICT, presented in the Table below.

Non-specific provisions also contain implications for ICT development. General provisions such as the Preamble recognize the importance of accessibility to information and communications technology in the context of enabling persons with disabilities full enjoyment of their rights (Convention, 2007, Preamble). It is pertinent to highlight that although the Preamble does not establish binding obligations, it has a fundamental role in determining the object and purpose of the treaty. Similarly Article 3 establishes the foundation for the interpretation and implementation of the CRPD, indicating that accessibility is one of the Convention's "General principles." (Convention, art. 3, § (f)).

Articles dealing with other substantive issues invariably reference the use of ICT. For example, Article 29's promotion of participation in political and public life delineates measures to guarantee the right to vote, with voting procedures facilitated by new technologies where appropriate (Convention, 2007, art. 29, § (a)). Article 30, which addresses participation in cultural life, recreation, leisure and sports, outlines the obligation to ensure intellectual property law do not constitute an unreasonable or discriminatory barrier for people with disabilities when accessing cultural materials (Convention, art. 30, § 1(c)).

Removing such barriers often involves the use of ICT devices. For instance, digitalizing printed materials is an effective way to provide access to copyrighted texts for people with visual disabilities (Convention, art. 21(b)). Finally, Article 32 § 1, which focuses on international cooperation, advocates the provision of technical and economic assistance where appropriate, such as encouraging the sharing of technologies to connect persons with disabilities with accessible and assistive technologies (Convention, art. 32, § 1 (d)).

Table. Convention Provisions Addressing ICT

Article 2	Definition of “Communication” – “includes languages, display of text, Braille, tactile communication, large print, accessible multimedia as well as written, audio, plain-language, human-reader and augmentative and alternative modes, means and formats of communication, including accessible information and communication technology.”
Article 4	“General obligations” Article establishes that States Parties shall promote research and development, and the availability and use of new technologies, including ICT. (Art. 4 §, 1(g)).
Article 9	Specifies measures to ensure access to people with disabilities, on an equal basis with others, to ICT, including Internet, and to eliminate obstacles and barriers to information, communications and other services provided to the public, including electronic services. (Art. 9 §, 2 (g)).
Article 9	Promote ICT design, development, production and distribution at an early stage, so that these technologies and systems become accessible at minimum cost. (Art. 9, §2 (h)).
Article 21	All provisions in the “Freedom of expression and opinion, and access to information” Article are relevant to ICT in virtue of Article 2. In this respect, State Parties have to ensure the right to freedom of expression and opinion and access to information on an equal basis with others and through all forms of communication. In particular, they shall urge “private entities that provide services to the general public, including through the Internet, to provide information and services in accessible and usable formats for persons with disabilities” and encourage “the mass media, including providers of information through the Internet, to make their services accessible to persons with disabilities.” (Art. 21, §§ (c)–(d)).

The implementation of the CRPD in the realm of ICT will face numerous challenges, as indicated by a large gap between today’s accessibility difficulties and the goals established by the Treaty. The majority of the potential State Parties to the Convention have already developed programs addressing a variety of disability issues contained in the CRPD with relative success, but only a few have adopted and enforced accessible design standards for ICT (UNESCO, 2005).

C. Instructing Learners with Disabilities

Students with disabilities are a diverse population with varying levels of ability, interest, impairments, and skills such as information and computer literacy. As such, students with disabilities have significantly differing needs and require individualized methods for equal and accessible distance learning opportunities. Investigators at the Southeast DBTAC (2005) concluded that effective distance learning opportunities for students with disabilities is less about their abilities, however, and more about the accessibility of the course itself.

Facilitating successful academic achievements for children with disabilities, and transition, post-secondary education, training, and employment for adults with disabilities requires specialized instructional methods, strategies, materials, modifications and accommodations, highly qualified special education teachers, effective transition planning, and faculty with the will and way to meet individual learner needs. We review the range of needs, and best practices for meeting the needs, in general terms, beginning with children, followed by transition, and adults with disabilities.

1. Children

The IEP, and the goals, strategies, arrangements, and modifications necessary to implement the IEP, are essential for meeting the uniquely individual needs of each child with a disability. Here is a brief glimpse at but a fragment of the considerations necessary in preparing the IEP, in light of the diversity of children served under the IDEA:

- Participating in a small group discussion for the child who is deaf; hearing instructions from the physical education teacher above the din of the gymnasium for a child using a hearing aide;
- Comprehending grade level reading assignments for the child with a learning disability in reading; preparing written reports for the child with a learning disability in written expression;
- Calculating large numbers or measuring angles for the child who is blind; following the band conductor's directing for a child with low vision;
- Managing impulsive or violent outbursts for the child with traumatic brain injury or a serious emotional disturbance;
- Measuring distances and volumes for the child with dramatic Tourette's based tics;
- Maintaining focus for instructions, reading, test taking, and other tasks, amid typical classroom distractions, for the child with Attention Deficit Disorder;
- Making a class presentation for a child with a speech impairment;
- Going on a class fieldtrip to a unique and remote geological area for a child with an orthopedic impairment caused by Cerebral Palsy;
- Partnering on projects with other students for a child with Asperger's Syndrome.

Research demonstrates that the least restrictive environment (LRE) and applicable best practice for the vast majority of children with disabilities, is to provide their educational services in inclusive classrooms (Frattura & Capper, 2006; Jenkins, Antil, Wayne, & Vadasy, 2003; McLeskey & Waldron, 2007; Mortweet, Utley, Walker, Dawson, Delquadri, Reddy, et al., 1999; NCD, 1994; Rea, McLaughlin, & Walther-Thomas, 2002; Waldron & McLeskey, 1998). Inclusion refers to the provision of specialized educational services to a child with a disability in the general education classroom (Waldron & McLeskey; Rea, et al.). Some

children will require a more individualized service, such as physical therapy, counseling, or direct intensive reading instruction in a one-to-one (more restrictive) setting (NCD, 1996; Vaughn & Linan-Thompson, 2003).

Additional evidence-based practices include: 1) instructional strategies such as small group instruction, modeling and strategy training, teaching metacognitive strategies, peer tutoring, cooperative learning, direct instruction, and functional instruction; 2) progress monitoring and curriculum-based measurement; and 3) behavioral techniques, such as precision requests, response costs, behavior momentum, self monitoring, and applied behavior analysis (Browder & Cooper-Duffy, 2003; Cook & Schirmer, 2003; Deno, 2003; Jenkins, et al., 2003; Landrum, Tankersley & Kauffman, 2003; Mortweet, et al., 1999; Vaughn & Linan-Thompson, 2003). We shall discuss a few of these practices as applicable in Part III.C. (infra).

The highly qualified special education teacher is an essential member of the team that develops the IEP, oversees its implementation, documents the child's progress, and reports back to the team (CITE). Since passage of the NCLB, this is one who: 1) has full State certification or licensure as a special education teacher; 2) has at minimum a bachelor's degree (10)(B)(iii); and 3) meets applicable State requirements or demonstrates competence in the core subject matters s/he teaches to children with special needs (IDEA, 2005, 20 U.S.C.A. § 1401(10)(B),(D)). Teachers new to the profession further must demonstrate subject matter and teaching skill competence via passing a "rigorous" State assessment, typically leading to certification or licensure (20 U.S.C.A. § 7801(23)(B)).

2. Transition

Transition services are "a coordinated set of activities for a [student] with a disability" that are "focused on improving [her/his] academic and functional achievement ... to facilitate ... movement from school to post-school activities, including post-secondary education, vocational education, integrated employment ... , continuing and adult education, adult services, independent living, or community participation ..." (IDEA, 2005, 20 U.S.C.A. § 1401(34)(A)). The services must be based on the student's needs, "taking into account ... strengths, preferences, and interests; and includ[ing] instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation." (20 U.S.C.A. § 1401(34)(B)–(C)). Transition services must begin no later than age 16 and are developed as part of the IEP (20 U.S.C.A. § 1414(d)(1)(A)(i)(VIII)).

Effective transition services are essential for developing the skill base and confidence necessary to live a productive, successful, and independent life. (Center for Workers with Disabilities, 2006). Student-centered planning, vocational assessment, parental involvement, knowledge of legal rights, responsibilities and community resources, developing social and self-advocacy skills, and a personal understanding of strengths, weaknesses and needs are important components of effective services (Center for Workers with Disabilities, 2006; Connecticut Transition Task Force, 2001; Kohler & Field, 2003). Among evidence-based and highly promising practices for effective transition are:

- comprehensive transition planning beginning at age 14
- educational decisions based on the student's interests, goals, and visions

- benefits planning and education
- paid work experiences
- interagency collaboration
- job search skills
- self-awareness and reflection
- ensuring jobs and training are in place upon high school graduation
- utilizing the Social Security Administration “cash and counseling” waiver, which permits consumer control over public funds to directly select and purchase individualized support services
- maintaining transition services for one year beyond high school and into employment or post-secondary education or training (Center for Workers with Disabilities, 2006; Kohler & Field, 2003).

3. Adults

The primary aim of education and training for adults has become learning how to learn. Research on adult education in the last two decades indicates career and vocational educators place too much emphasis on discrete job skills needed in the prevailing job market, which are likely to be obsolete in a decade (Allsopp, Minskoff, & Bolt, 2005; Sizoo, Agrusa, & Iskat, 2005). More importantly, adults must develop the skills to learn new skill sets, and be lifelong learners, as employers and the job market will demand their willingness and ability to adapt (Sizoo, et al.). The Learning and Study Strategies Inventory (LASSI) is one successful tool for measuring strategic learning skills, described as: 1) learning skills (i.e., information processing, test-taking, identifying main ideas), 2) willingness to learn (i.e., motivation, attitude, anxiety), and 3) self-regulation of learning (i.e., time management, self-testing, concentration, study aids) (Sizoo, et al.).

Learning how to learn requires the willingness and self-regulation to identify weaknesses and focus attention on improving those skills. Learning how to manage anxiety improves performance significantly (Sizoo, et al., 2005). Adults with learning disabilities attending college benefit from appropriate accommodations of materials and instruction, but may not be prepared to learn new skills in the absence of essential learning strategies (Allsopp, et al., 2005). Colleges and universities today cater to a broader range of student abilities, including students with varying disabilities, and are involved in instructing learning strategies to assist struggling students (Allsopp, et al.).

Internships, or experiential education, akin to paid work experiences for students with disabilities transitioning out of high school, may be another important strategy. College students with disabilities typically have less work experience and are less likely to complete college than their peers without disabilities (Wagner, et al., 2005; Zafft, Sezun, & Jordan, 2004). Faculty and administrators in higher education, enhance academic and employment outcomes for students with disabilities through developing experiential learning opportunities in their community, and by offering course credit for these experiences (Zafft, et al.).

III. THE STATE OF ACCESSIBLE DISTANCE EDUCATION

Students with disabilities have participated in distance education activities throughout the history of these activities. Likely, distance education, whether via mail, fax, phone, another former common method, or most recently the Internet, always have experienced accessibility challenges that may preclude their success. Prior to the Internet, distance learning was such a comparatively small practice that it fell largely under the radar of most educators and students. Only since distance learning transitioned and grew exponentially via the Internet medium into today's wide range of such opportunities, however, has the question arisen whether these methods violate federal disability laws.

In these early days of the 21st century, great numbers of formal education programs operate profitable businesses, provide public services as agents of the state or local government, or function under governmental mandates. In these capacities, their responsibilities arise to ensure equal opportunities and appropriate educations to persons with disabilities. In this part, we review the experiences of learners with disabilities in light of these mandates, analyze whether these programs comply with federal law, and provide research-based best practices for proceeding with distance learning opportunities that offer meaningful benefit to both persons with and without disabilities.

A. Experiences of Learners with Disabilities

Students with disabilities are gaining opportunities via online distance learning and Internet resources to have individualized learning experiences (e.g., assignments and feedback), extra practice, automated progress tracking and reporting to invested partners (e.g., teachers, parents), active participation in cooperative learning activities, and to review simulations and skill modeling (Arrigo, 2005; Smith & Meyen, 2003). As a tool the Internet is more cost effective to school systems compared with assistive technologies, because of its multiple applications for multiple learners rather than singular use for specific users (Smith & Meyen). The Internet provides vast, inexpensive or free resources for the instructors of students with disabilities, including electronic journals and databases, synchronous and asynchronous communication tools (e.g., email, chat, public assignment or event calendaring), tools for organizing information, multimedia literacy instruction, and multimedia portfolio assessment (Smith & Meyen).

Persons with vision, hearing, fine motor, or speech impairments, attention or seizure disorders, learning and other disabilities, nonetheless find many information & communication technologies pose barriers to their full participation in online activities. Persons with visual impairments do not get a structural overview of a web page when first encountering it as do persons without visual impairments (Arrigo, 2005). Graphic images that convey imbedded information are not accessible to persons with significant visual impairments (Burgstahler, Corrigan, & McCarter, 2006). Audio conferencing may exclude persons with speech impairments or persons with hearing impairments in the absence of closed captioning (Burgstahler, Corrigan, & McCarter, 2004; Klein, et al., 2003). Video presentations without closed captioning or a live sign language interpreter (on sight or remotely) pose these same barriers to persons with hearing impairments (Burgstahler, et al., 2006). Instant messaging poses barriers to person with fine motor impairments in their hands and persons with specific learning disabilities in reading or writing (Arrigo, 2005). The cost of voice recognition software, alternative input devices, screen readers, and other assistive

technologies, which provide access for persons with varying impairments, may be prohibitive (Arrigo, 2005).

Many online courses provided by postsecondary institutions are not accessible (Arrigo, 2005). Multiple studies have shown that university web pages, including institutions in the UK and Ireland, generally are not accessible, using baseline metrics such as Bobby, an automatic accessibility checker (Rowland, 2000; Jackson-Sanborn, Odess-Harnish & Warren, 2002; Kelly, 2002; Schmetzke, 2001; Thompson, Burgstahler, Comden, 2003). Though most postsecondary institutions in a 2003 study indicated they provide online distance education, “only 18% indicated that they followed established accessibility guidelines to a major extent; 28% followed guidelines to a moderate extent, 18% followed guidelines to a minor extent, 3% did not follow guidelines at all, and 33% did not know if the Web sites adhered to accessibility guidelines.” (Burgstahler, et al., 2004, p. 237).

One of the difficulties in producing accessibility for online instruction comes about because faculty members often are responsible for getting their content on the Web. Although these faculty are experts in their domains, they usually do not have time or motivation to learn evolving methods for creating accessible online content (Cook, & Gladhart, 2002; Edmonds, 2004). Further, instructional technology leaders on college campuses regard user support and budget as higher priorities (Cook, & Gladhart, 2002). Recently, faculty are able to upload their content to content management systems (CMSs), such as WebCT/Blackboard. Since these web applications are created and maintained by third parties, some web-access decisions are removed from university personnel. Although generally these CMSs are becoming more accessible, some barriers still remain (e.g., WebCT) (Illinois Center for Instructional Technology Accessibility, 2006).

Many accessibility barriers can be avoided by careful planning of course design. Ideal for this purpose are use of universal design principles. For instance, universally-designed learning opportunities may employ “materials in varying and redundant media,” offer “alternative means to demonstrate knowledge/skill acquisition (e.g., written, spoken, work product, demonstration, ... PowerPoint or SMART board),” or include geographically-distributed learning via “distance learning modules, web-conferencing, instant messaging, chat classrooms, VoIP (Voice and Video over IP), listservs, and email distribution/submission of materials.” (Myhill, 2006, p. 4).

Additionally, accessible Web casts can be created due to the ability to stream different forms of media simultaneously. The Independent Living Research Utilization program (ILRU) holds regular Web casts and provides live captioning with each Web cast to make the session accessible to participants with hearing impairments. Archived Web casts are supported by documents containing complete transcriptions of the Real time sessions (ILRU, 2006). The Law, Health Policy & Disability Center (2005; 2006) at the University of Iowa similarly conducts numerous Web casts and interactive trainings with Real time captioning and free archived transcripts, such as for the Disability Program Navigator Leadership Audio Conference Series, and its many other online trainings and discussions.

Using Cascading Style Sheets as the basis for accessible Web page templates, “standardizes and simplifies the formatting of each page,” reduces time to build a new accessible page, and simplifies navigation for a person using a screen reader or a keyboard without a mouse (Burgstahler, et al., 2006). Alternative Text tags provide screen readers access to information imbedded in graphics (Klein, et al., 2003).

Accessibility features increasingly are integrated into online course management tools. For example, Blackboard (2004) software solutions are designed to comply with Section 508 regulations as well as the World Wide Web Consortium (W3C) Web Accessibility Initiative Standards (WAIS). Inbuilt features allow users to make their course content and presentations more accessible using alternative text tags (ALT Tags), multiple presentation formats, client-side server maps, and accurate markup features such as header elements. Moreover, the tools are compatible with assistive technologies, including screen readers.

Researchers are developing adaptive course management tools that can be tailored to individual learners (Cirillo, Cozzolino, De Santo, Marsella, & Salerno, 2000), such as the Agent Based Intelligent Tutoring System (ABITS), which acts as a remote private tutor (Capuano, Marsella, & Salerno, 2000). These intelligent tutoring systems are configured to deliver appropriate content using virtual training assistants that provide ad-hoc modifications based on learner preferences (Cirillo et al, 2000).

B. Distance Education Compliance with Disability Law

The enormous variety of purposes, uses, and applications for distance learning that reach students with and without disabilities of all ages provides more opportunities to evaluate legal compliance than this chapter can address. We narrow our focus to address three scenarios with present or emerging high incidence distance education programs, in light of common disabilities and applicable law.

1. State Supported Online High School Curriculum Courses

Scenario: Melanie, a high school student with grade level cognitive abilities, has limited use of fingers (i.e., muscular lock-up) and slurred speech due to cerebral palsy. Melanie receives special education and related services under the IDEA including speech-language services, occupational therapy, adaptive physical education, and use of assistive technologies to facilitate written and spoken communication. She intends to enroll in an advanced civics elective available through the state's virtual high school for credit towards high school graduation. The IEP team agrees the course is appropriate to meet her personal academic goals toward applying for a competitive liberal arts college.

The course is designed to be self-paced and reached from any computer with Internet access. It entails extensive reading and writing assignments using specified online and/or library resources. The course includes mini multimedia lectures, online progress quizzes, and major assignments submitted via email. Melanie will be one of 30 students taking the course around her state. The instructor provides general information to the students via a Listserv, and is reachable during set office hours via phone or email.

Distance education services provided to K-12 students with disabilities are not likely to meet their special needs if constructed and delivered outside of the FAPE. One size fits all instruction was the staple pedagogy that consistently failed children with disabilities prior to the IDEA, and continues to do so when appropriate individualized services are not provided (Cook & Schirmer, 2003; IDEA, 20 U.S.C.A. § 1400(c)(2) & (5)). The cornerstone of a FAPE is the individualized education plan (IEP), prepared annually by a multidisciplinary

team of experts,⁷ and which must be “reasonably calculated” to meet the student’s specific educational needs (Myhill, 2004, p. 1057; Board of Education v. Rowley, 1982, pp. 206-207).

Violations of the FAPE occur when services (a) are not free, (b) are not appropriate, (c) do not meet state educational standards; (d) do not comport with the student’s IEP, (e) are not provided under public supervision, (f) do not comply with IDEA procedural safeguards, (g) do not occur in the LRE, or (h) do not provide educational content commensurate with that provided to grade level peers without disabilities (Myhill, 2004). Common violations occur when significant evidence indicates the design or implementation of the IEP was insufficient (Myhill, 2004).

The online civics course is an excellent way for Melanie to experience advanced curriculum appropriate to her individualized educational needs. Enrollment and participation may not require fees of Melanie, though an exchange of funds may occur between her local high school and the virtual (state) high school. If the online course typically is attended by students away from school, and Melanie will need speech recognition technology to produce and edit her writing along with an alternative input device to access and move through the course materials, the IEP team must designate these needs in her IEP and provide them without cost.

The IDEA procedural safeguards are due process rights provided to the student with a disability and her family ensuring they have notice, the right to participate in all educational decisions, access to applicable records, and meaningful opportunities to question and challenge the appropriateness of the IEP and accuracy of records (20 U.S.C.A. § 1415). They are intended to keep the family in the loop and the school accountable. A well designed and implemented IEP prepared in collaboration among the members of the multidisciplinary team is the best evidence that procedural safeguards have been followed.

Given the civics course follows and provides state approved curriculum and assessment, and is facilitated and monitored by the state such as through a highly qualified teacher, the course likely will comply with the IDEA. Though the course is provided to Melanie in isolation from her peers without disabilities, if the IEP team agrees, this would not deny her services in the least restrictive environment because it offers a highly normalizing learning opportunity that is self-paced by preference and not segregated without choice.

2. Municipal College Degree Programs for Working Adults

Scenario: Raymond, a local book store clerk, is deaf. He reads lips with average accuracy and uses American Sign Language (ASL) for the majority of his daily face-to-face communications. Raymond’s speech is significantly lacking in articulation as is typical of a person who has been deaf since birth. Raymond was accepted into the City College library sciences program as a qualified individual with a disability meeting the essential eligibility requirements. The public college receives federal funding through grants and student loans. As he works a regular 8 to 5, Monday to Friday shift, he will participate in the College’s working adults degree program, which provides many of the courses Raymond will need after regular business hours or via online distance learning.

⁷ The team commonly includes the student’s parent or guardian, school administrator, special and general education teachers, and providers of any anticipated or currently provided related services (such as occupational or physical therapy, speech language services, counseling, and assistive technology) (Myhill, 2004).

In the first year of Raymond's studies he will take general credit courses required of all City College students, such as English and History, as well as introductory courses in the School of Library Science. The courses largely are self-paced and reached from any computer with Internet access. They entail extensive reading and writing assignments using specified print materials. Compared to the often large sections of most first year courses, the evening and distance courses average 20 to 40 students. All of Raymond's first semester courses require a class meeting once per week, either in person or via web conference, where the instructor and students engage in discussion of course subject matter. This also is an opportunity for students to meet, form study groups, and raise questions to the instructor.

Title II of the ADA and § 504 of the Rehabilitation Act require City College to ensure their communications with Raymond "are as effective as communications with other[]" students (28 C.F.R. § 35.160(a)). The College must 1) "make reasonable modifications to policies, practices, and procedures," 2) provide services in the "most integrated setting appropriate," 3) remove communication barriers, including those posed by the design of the web resources, and 4) provide necessary auxiliary aids and services to ensure Raymond has "an equal opportunity to participate in, and enjoy the benefits of" City College (Blanck, et al., 2005, p. 345; U.S. Department of Education, 1997; 28 C.F.R. § 35.160(b)(1)). The College, however, does not have to make modifications that "fundamentally alter the nature" of their programs and services (U.S. Department of Justice, n.d., § II-3.6100).

The online college courses are a beneficial public service to students with and without disabilities in the community. As a student who is deaf, all class discussions (in-person or online), communications with the instructor, media presentations (e.g., class video), and audio web course materials, for instance, must be provided to Raymond in an alternate format, that is equally effective for him as the audible components of these activities for his peers. Whether attending the weekly class in person or via web conference, the College must provide Real time closed captioning or ASL translation for all such communications.

Notably, both closed captioning and ASL translation are reasonable accommodations and/or necessary auxiliary services with costs that shall be borne by the College, not Raymond. Web conferencing applications must have the capacity to display live captioning provided by a third party, or Real time video ASL translation. Web based course materials, such as audio/video media clips, must provide concurrent captioning or a complete transcript of the audio content. The College cannot require that Raymond attend weekly classes in a separate location, such as where the ASL Translator is located. He must have a meaningful opportunity to join his peers in an integrated setting.

Additionally, City College must accommodate Raymond's need to communicate to his peers in class (again whether in person or via web conference), in a manner ensuring equality of communication. This may take the form of his signing to a translator who then speaks or writes/types out his communication in Real time. It may be reasonable to permit Raymond extra time to speak in person or in class more slowly, if doing so effectively improves his enunciation. Similarly, it may be more effective for Raymond to type out of his own messages via instant messaging or for a speech synthesizer to enunciate. Importantly, the instructor must not dissuade Raymond from meaningful participation by virtue of his requiring extra time for communication, but may consider all available possibilities for the mutually best method. Given the range of reasonable accommodations, it is unlikely the College could be held accountable to purchase the speech synthesizer.

These accommodations are not likely to “fundamentally alter the nature” of Raymond’s courses, such as to preclude their availability to him, as they largely are technological extensions of the College’s already existing course web conferencing system. The availability of ASL translators has become a widely common and accepted practice under ADA.

3. Business Providing Skill Training and Certifications

Scenario: Eleanor is two years out of high school, providing administrative support for a local insurance agency. She transitioned into the full-time position after working part-time with the company during high school. Eleanor has minimal vision, whereby she can identify shadows and some patterns, but is not able to discriminate faces, pictures, or words. Eleanor is a skilled typist. She uses a standard keyboard for word processing along with a screen reader and headset for reading back what she has written to check its accuracy. She also uses the screen reader to browse the internet and read email. Eleanor is proficient at reading and typing Braille.

The office has a new claims adjuster position opening in the near future and Eleanor has expressed her strong interest in the position to her employer. The essential job functions will require that she develop a few new skill sets, including client interviewing, auditing, and business writing. She was referred to a private company, Stellar, that offers trainings specifically for these skills, among many others, online via distance learning. Stellar is a business engaged in substantial interstate commerce providing several hundred classroom and distance learning courses. Stellar has its headquarters in another state, but a significant online presence. This is very convenient for her, and many others with and without disabilities, who do not live near the headquarters. Eleanor intends to register for the three courses she requires and take the classes via distance learning. She will pay the complete costs of the courses herself.

Stellar’s web based distance courses are completely self-paced and accessed from the Internet. They entail extensive reading of online textual material, preparing some written reports, taking online quizzes and tests. The materials frequently are enhanced with multimedia examples. The courses do not have assigned instructors, however, staff are available via phone, email, and instant messaging to provide technical assistance.

As a title III public accommodation, Stellar cannot deny Eleanor the full and equal enjoyment of their services on the basis her disability (ADA, 42 U.S.C. § 12182(a)–(b)). Stellar is obligated to make reasonable modifications to their procedures, practices, and policies necessary to accommodate Eleanor’s unique needs as a person with a significant visual impairment. Eleanor, attending these courses in the evenings while at home, will use her own computer and Internet access, and will supply her own screen reader and headset. Stellar must ensure that its distance learning materials are compatible with screen readers so that Eleanor effectively can navigate the course content. This includes providing alternative text for all essential content that the screen reader otherwise cannot access, namely graphics. Additionally, essential content provided only video media require full text-based descriptions. None of these modifications are likely to “fundamentally alter” the nature of Stellar’s services as they are common variations on the already web-based course materials. Moreover, compared with the two prior scenarios, the costs of assistive technologies and services under title III falls largely on the consumer.

C. Emerging Best Practices and Policy Recommendations

With increasing integration of the Internet and Web in education, several best practices have emerged to ensure and facilitate accessibility in online courses. “[U]niversally designed technologies provide for input and interaction in multiple alternative and equally effective ways (e.g., keyboard, mouse, or voice input; visual graphic or text output).” (Myhill, et al., in press). The IDEA supports universally designed technology, “as a vehicle for maximizing curricular accessibility for all students, including those with disabilities” (Downing, 2006, p.71). The Center for Applied Special Technology (CAST, 2006) suggests the following Universal Design for Learning (UDL) guidelines: a) multiple means of representation (i.e., both technical and content presentation), b) multiple means of expression (i.e., ways for student to represent knowledge), and c) multiple means of engagement (i.e., addressing affect and motivation).

Developing a course to be accessible from the onset is both less expensive and easier to design than trying to modify or redesign existing inaccessible course materials (Burgstahler, et al., 2006). Creating accessible web page templates and Cascading Style Sheets, to be used as the framework to create all distance learning courses by an institution, can facilitate compliance with accessibility standards (Burgstahler, et al.). People with disabilities often know what does and does not work for them. Meaningful involvement of students with disabilities is essential for identifying specific barriers to their full participation in distance learning activities (Blue Ridge Community College, 2004). Administrators and faculty demonstrate their respect for student expertise and time by providing course credit, tuition reduction, or stipends commensurate with the time required to evaluate distance education materials and to make recommendations for overcoming barriers (Blue Ridge Community College, 2004; Southeast DBTAC, 2006).

Hands-on training and lab demonstrations are effective methods for developing staff awareness of the access needs of students and faculty with disabilities, and developing skills in creating accessible distance learning opportunities (Southeast DBTAC, 2006; University of Florida, 2007). Blue Ridge Community College (2004) developed *The Faculty Resource Guide to Removing Information and Education Barriers to Students with Disabilities* (2004), to increase awareness about accessible IT and the impact of different disabilities on a student’s ability to function successfully in an academic setting. When faculty and web designers are trained to focus on the needs of the user, the accessibility of the end product is much higher (University of Florida, 2007).

Designers must understand the range of barriers (e.g., fine motor, visual, stamina, hearing, attention, memory, and others) for students with disabilities that arise with online learning opportunities, and how these affect course content, presentation, and web page formatting (Klein, et al., 2003; Samant, et al., 2006). For example, people with visual disabilities need descriptions for graphics; adequate space around links might be necessary for people who have fine motor difficulties using a mouse, and high rates of flickering or motion on a web site may induce a seizure for persons with seizure disorders, or prove highly distracting for persons with Attention Deficit Disorder (Klein, et al.; Wall & Sarver, 2003). Placing questions at the end of a course segment, rather than at the end of a module, ease the strain on students with cognitive disabilities, such as traumatic brain injury, to focus on, and retrieve, relevant information (Southeast DBTAC, 2006). Providing proactive technical assistance to instructors for making websites and on-line learning opportunities accessible,

such as specific on-site or telephone consultation, the creation of templates and on-line tutorials, archiving workshops, training materials, and curricula on-line is strongly recommended (Southeast DBTAC, 2006; University of Florida, 2007).

Obtaining buy-in from key educational administrators and other key stakeholders is vital to the successful adoption and implementation of policies and practices to assure IT accessibility. Active involvement and support from key faculty and administrators can provide a high level of necessary visibility (Southeast DBTAC, 2006; University of Florida, 2007). It is also important to identify and focus on “Agents of Change.” Priority should be given to reaching those stakeholders whose positions (e.g., information technology specialists, dean/director of information technology, department chair) allow them to have an immediate impact on the accessibility of websites and on-line courses (Southeast DBTAC, 2006).

CONCLUSION

Vast technological advancement rapidly is broadening the reach and diversity of distance learning opportunities for students of all ages, needs, and abilities. Federal and state initiatives increasingly are redefining educational policy and practice, and provide generous support to these programs with significant funds. Private distance education enterprises are among the most sophisticated and profitable providers of the job skill trainings in greatest demand.

U.S. disability law and policy demand that people with disabilities have the same rights to independent and self-determined lives, to pursue meaningful careers, and to enjoy full participation and integration in the political, economic, educational, and social mainstream as persons without disabilities. Universal design principles offer a framework for the design of distance learning technologies and services to provide effective access and meaningful benefit to the most diverse range of learners. Public and private educators and businesses must ensure their programs and services provide equal benefit to diverse learners with disabilities. In so doing, we are on the path to tearing down the last of the physical and attitudinal barriers that historically have isolated and discriminated against people with disabilities.

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