

# ONLINE DISTANCE EDUCATION - "ANYTIME, ANYWHERE" BUT NOT FOR EVERYONE

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## INTRODUCTION

With the tremendous growth of online distance education programs, it is easily forgotten that the concept of learning “anytime anywhere” is not a new one. Distance learning, in form of correspondence or home study, reaches back over 250 years in this country (Valore and Diehl, 1987: 2). The first formal recognition of home study occurred in 1883, when the State of New York authorized the Chautauqua Institute to award degrees earned through correspondence (Valore and Diehl: 2). That there was, next to economic and social demands arising from the advancing industrialization, a concomitant democratic-egalitarian sentiment behind the drive for distance learning found its expression perhaps most clearly in the “Wisconsin idea” and the creation of the University of Wisconsin Extension.

“The increasing spirit in Wisconsin demanded that the university should serve the state and all of its people and that it should be an institution for all the people within the state and not merely for the few who could send their sons and daughters to Madison; thus was brought about the establishment of the extension division about five years ago.” (McCarthy 1912: 132).

It is questionable whether the architects of the Wisconsin idea, which inspired and shaped university extensions all over the country, were including people with disabilities in their thinking when they proposed to make education more available to the community at large. There is no indication in the pertinent literature that this was the case (McCarthy 1912; Patzer 1924: 285-301; Doan 1947, *The Wisconsin Idea* 1981, Knox and Corry, 1995: 181-192). However, regardless of whether people with disabilities were included or not, it is likely that they were among the beneficiaries of the extended programs. Ommerborn (1998: 22-26) argues that it was not by sheer linear extension of educational programs-the same education now offered to a broader segment of the population-but by the innovative, individualized forms of pedagogy and delivery that distance study resulted in the opening of higher education to new groups, including people with disabilities. Valore and Diehl point out that people with disabilities had been taking advantage of distance learning opportunities even prior to the emergence of university extensions: “Since the beginning, accredited home study schools have extended training to the handicapped, providing educational opportunities that might otherwise not have been available to them” (p. 14). The opening of the educational programs to people with disabilities was not limited to specialized correspondence schools, such as the Hadley School for the Blind founded in 1920, but applied to home study schools in general. Miller et al. (1999) describe students with disabilities as one of several “niche” groups for which distance learning opportunities are particularly suited.

Despite the increase in educational opportunities through distance education and legislative measures, particularly Section 504 and ADA, people with disabilities-some 54 million in the U.S. (McNeil, 1997)-remain underrepresented in postsecondary education. Longitudinal data indicate that students

with high-school diplomas are less likely to enroll in public four-year colleges, and that those who do enroll are less likely to graduate (Horn and Berkold, 1999). As Gadbow and Du Bois (1998) point out, a large majority of people with disabilities under the age of 65 are intellectually capable of succeeding in postsecondary education, yet most have not attended institutions of higher learning.

Recent advances in digital information and telecommunication technology present tremendous opportunities for this underserved segment of the population. This is particularly true for people with print disabilities, who, be it because of blindness, visual impairment or motor problems, may have difficulties attending traditional on-site programs. With the help of screen readers (software that converts the text on the screen to voice or sends it to a Braille embosser), digitized text is, at least potentially, accessible to those who are unable to see print or who, because of a learning disability, have difficulty reading it (Mace, 1996; Sreenivasan, 1996). With modified or specially designed input devices, many individuals who cannot hold books or turn pages because of motor impairments are able to navigate even through very lengthy electronic documents.

Unfortunately, the very technology that has opened the door to unprecedented access also harbors the possibility for the very opposite. Just as there are enabling and disabling conditions in the physical environment, so are there conditions associated with digital technology that result in the inclusion or exclusion of certain people. Technology that is not universally designed, without consideration for the full spectrum of human (dis)abilities, is likely to contain access barriers for people with print disabilities.

While inaccessible design of online resources puts all people with print disabilities at a disadvantage, no matter whether they study on-campus or off-campus, the impact is most drastic in an online distance-education environment. Let us just consider some of the major resources that constitute typical state-of-the-art online distance programs: institutional web pages with general campus and program specific information; interactive web pages that serve specific administrative purposes, such as enrollment, course selection and grade reporting; web-based courseware packages, such as Blackboard or WebCT, that furnish the general framework for instructions; web-based instructional materials, such as electronic books, online journal articles and electronic reserve materials; electronic discussion forums for online class meetings; and online library research resources, including catalogs, indexes to the journal literature, and other electronic reference works. With virtually all aspects of a course happening on the web, as it is increasingly the case in distance education, how could students with print disabilities possibly participate when these resources are inaccessible to them? The amount of accommodations and adaptations to the regular online course that, by law, need to be made under such circumstances would be tremendous. And even then, the legality of the end result would be questionable: In essence, students with print disabilities would end up taking courses in a separate track—a scenario that is at odds with the legal mandate to provide programs in the most integrated settings.

How accessible are the nation's distance education programs? A comprehensive answer to this question would require an investigation involving the full spectrum of the various web-based resources listed above. This study, much more humble in scope, focuses on the accessibility of top-level distance-education web pages. Before I describe this study in detail, I shall briefly discuss the legal mandate for accessibility in a virtual campus environment, and I shall review the literature dealing with the barrier-free, universal design of online instructional resources.

## **LEGAL MANDATE FOR ACCESSIBLE ONLINE RESOURCES**

Coombs (2000a) points out that there are at least four reasons to implement technology that is accessible to the widest possible segment of the population: First, ethically speaking, it simply is the right thing to do. Second, it is the economically sensible thing to do—considering the extra cost involved in producing alternative versions of instructional materials. Third, it is the selfish thing to do: With advancing age, as our senses grow weaker and our mobility decreases, we all stand a good chance of becoming beneficiaries of a barrier-free information infrastructure. Fourth, as will be pointed out in the remainder of this section, the law demands that we do so.

Of the different federal civil-rights statutes that have some bearing on electronic and information technology, Section 508 of the Rehabilitation Act Amendments of 1998 (amendments to the original Vocational Rehabilitation Act of 1973) and the Americans with Disabilities Act (ADA) of 1990 are likely to be the most relevant. Section 508 requires that information technology procured, developed, maintained and used by federal agencies must be accessible to people with disabilities, unless such requirement imposes an undue burden [1]. Compliance standards, developed by the Architectural and Transportation Barriers Compliance Board (“Access Board”), were released in December 2000 and are scheduled to become effective in February 2001 and enforceable in June 2001 [2]. As of this writing, it is unclear to which extent Section 508 will reach beyond federal agencies and affect educational institutions. While Section 508 speaks about requirements for “Federal departments and agencies” [3], the U.S. Department of Education declared that “states which receive Federal funds under the Technology Related Assistance for Individuals with Disabilities Act of 1988, are required by that Act to comply with Section 508” [4]. Even if it turns out that state-controlled colleges and universities do not fall under the purview of Section 508, a positive impact is to be expected. Hardware and software companies seeking to do business with the federal government need to offer accessible products and services. Once these are on the market, they will be available to educational institutions as well.

Title II of the ADA, which applies to public entities, requires that universities make their programs and facilities accessible to people with disabilities by stipulating, in general terms, that

...no qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any such entity (Section 202).

When Congress passed the ADA in 1990, the World Wide Web, as we know it today, did not exist. Most electronic information was provided in text format, which is easily read with screen readers. The potential barriers created by poor web design were certainly beyond the horizon of legislators and federal administrators. Thus, it does not come as a surprise that the ADA, while mandating equal access to an institution’s resources, does not specifically address the design of web-based information services. Subsequent interpretations of the ADA, however, do.

In September 1996, the Civil Rights Division of the Department of Justice (DOJ) issued an opinion statement (letter #204) which directly addressed the issue of web accessibility. States and local governments as well as places of public accommodation are required to

... provide effective communication, regardless of whether they generally communicate through print media, audio media, or computerized media such as the Internet. Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well.

Perhaps the strongest support for the ADA's applicability to accessible web design is provided by the U.S. Department of Education, California Office for Civil Rights (OCR), in its letters issued in connection with a statewide ADA compliance review involving California colleges. Particularly instructive are the letters addressed to the Chancellor of California Community Colleges (CCC). One major concern addressed in these letters pertains to the acquisition of technology and expansion into distance education, including the Internet. The OCR criticizes that the practice of providing more and more information electronically, through the Internet or campus LANs, is often not accompanied by considerations for the barrier-free design of web resources that contain the information. As a remedy, the OCR suggests the development of access guidelines for distance learning and campus web pages:

If guidelines to ensure access are made available to colleges now, such information on how to structure distance learning programs and campus WebPages will not only ensure that colleges meet their legal obligations but will also enable colleges to save significant expense over the later cost of "retrofitting" these programs after substantial investment has been made in inaccessible structures. (U.S. Department of Education, Office for Civil Rights, Region IX, 1998).

Many, if not most, institutions of higher education have developed web policies for their campuses. However, little is known about how many of these include accessible web guidelines. If my extensive web search is any indication, accessible web design guidelines or policies are, at the present, the exception rather than the rule; and those that do exist deal almost exclusively with web pages, not online, web-based resources in general. Campuses with accessible web policies include San Jose State University, MIT, Regis University, University of Wisconsin and California Community Colleges. "San Jose State University World Wide Web Policies and Guidelines," drafted two years ago, *recommend* that "webmasters phase in access as soon as possible, especially as web pages are revised and redesigned" [5]. MIT's policy, noticeably stronger in tone, requires that "all Web pages associated with administration and services, courses of instruction, departmental programs, and institute sponsored activities, must conform to the Web accessibility principles"(emphasis added) [6]. Similarly, Regis University's "Web Accessibility Policy" emphasizes principles of universal design and mandates that all web pages associated with the institution must conform to its web accessibility guidelines [7]. The University of Wisconsin (UW) System operates under the recommendations developed by its Committee on Access to Technology for Individuals with Disabilities, and three of its campuses (UW-Madison, UW-Stevens Point and UW-Whitewater) have put in place their own ADA-compliant web design policies [8, 9, 10, 11].

Particularly stringent, as far as web page design is concerned, is the new UW-Madison policy (effective January 2001), which requires that, "[a]ll new or revised Web pages published or hosted by the University ... must be in compliance with the W3C Guidelines" (satisfying Priority 1 and Priority 2 checkpoints). Older ("legacy") pages need to be brought up to the same level of compliance within a year. The policies of California Community Colleges (CCC) stand out for their comprehensiveness: CCC's recent "Guidelines for Producing Instructional and Other Printed Materials in Alternate Media for Persons with Disabilities," adopted in 2000, contain a section that deals specifically with "Considerations for Formatting E-Text and Designing Software and Webpages." In addition, the campus' "Distance Education: Access for Students with Disabilities" policy, promulgated in 1999, mandates that not only web pages, but "all distance education resources must be designed to afford students with disabilities maximum ... access ... 'anytime, anywhere' without the need for outside assistance." Distance education resources must have " 'built-in'

accommodations” and their interfaces must be “accessible to ‘industry standard’ assistive computer technology in common use by people with disabilities” (p. 13).

## LITERATURE REVIEW

### General Literature

The concept of barrier-free, or universal, design has been around for at least several decades. To varying degrees, it has become codified in various building guidelines and regulations [12]. Its original focus-the removal of architectural barriers preventing wheelchair users from entering buildings and using their physical facilities-has evolved over the years into the broader notion of universal design, which extends into all design disciplines (architecture, exterior and interior design, product development, and communications) and which is powered by concern for all people.

Universal design attempts to meet the needs of all people, and includes those of all ages, physical abilities, sensory abilities, and cognitive skills. Universal design is the design methodology most appropriate for a true democracy, since it includes all types of people in the design process. Even though the resultant product may not be usable by absolutely everyone, they are usable by as many people as possible. Abilities are emphasized, and disabilities are de-emphasized. A single solution instead of multiple ones is the goal (Anders and Fechtner, 1992, p. 10).

While the notion of universal design has been discussed extensively in the architectural and exterior/interior design literature (see, for example, Branson, 1991; Lebovich, 1993; Peloquin, 1994; Wilkoff and Abed, 1994), its application to the electronic environment was, until a few years ago, rarely addressed in traditional print media. Instead, the theme was mainly carried by a rather tightly knit network of dedicated people who gathered at disability- and web-related conferences and shared their insights in form of presentations, white papers and web-posted articles. At the 1995 WWW4 conference, for example, papers on topics such as “Making the Web Accessible for the Blind and Visually Impaired” and “World Wide Web Accessibility for People with Disabilities. A Usability Perspective” were presented [13]. Papers delivered in 1996 at the 11th Annual Technology and Persons with Disabilities Conference, sponsored by the Center on Disability at the California State University-Northridge (CSUN), included the following topics: “Design Considerations for Software and Web Pages to Allow Access for People with Physical Disabilities,” “Libraries without Walls,” “Accessing the World Wide Web (WWW) for People Who Are Not Sighted,” “Accessibility to the Electronic Highway: Government Policy and the Right of All Americans to Communicate” and “Increasing Access to World Wide Web Sites for Blind and Visually Impaired Computer Users.” The above exchanges in the realm of the “invisible college” dovetailed with efforts of the World Wide Web Consortium (W3C), an international industry consortium founded in 1994, to develop common protocols for the web and to ensure its interoperability [14]. In 1997, it sponsored the launching of the Web Accessibility Initiative (WAI). The WAI’s *Web Content Accessibility Guidelines* [15] and *Techniques* [16], released in 1999, reflect the input of many players and are widely considered to be the most authoritative source on the subject.

## Library Literature

Not surprisingly, it was in the library field, where access to information was always regarded as a high priority, that concern for accessibility to electronic resources eventually caught on. However, initially the focus was mainly on adaptive technology, not on design-related accessibility of content (Schmetzke 2001). With a few exceptions (e.g. Brittain, 1995), accessible web design began to receive coverage in the library literature not until 1996. A trail-blazing special issue, co-published by *Library Hi Tech* and *Information Technology and Disabilities* and dedicated to “libraries and the empowerment of persons with disabilities,” covered in much depth the subject of access to digital information sources. Dixon’s article, in particular, focused on the creation of accessible web pages. Mike Paciello (1996a, 1996b), who was instrumental in launching the W3C’s Web Accessibility Initiative, published two articles on accessible web design in *Florida Libraries*. Two articles in *Choice* addressed the need to design libraries for accessibility and spelled out major principles of universal web design (Burgstahler, Comden and Fraser, 1997; Fraser, Comden and Burgstahler, 1998). In 1997, Oryx Press published “Information Access and Adaptive Technology” (Cunningham and Coombs). Chapter 11 included a detailed discussion of the web-access problems faced by people with disabilities as well as guidelines for accessible design. *The Chronicle of Higher Education*, widely read in all academic circles, published an article that stressed the similarity between physical access hurdles and barriers imposed by poorly designed web pages (Young, 1998). A recent article in the *Chronicle* emphasized the impact that Section 508 and the newly released Access Board standards are likely to have on colleges (Foster, 2001). During the past two years there has been a noticeable increase in library-related journal publications that seek to raise awareness concerning the need for accessible web design (e.g., Kautzman, 1998; Casey, 1999; Rouse, 1999; Hansen, 1999; Minow, 1999; Oppenheim et al., 1999; Blake, 2000; Jobe, 2000; Lescher, 2000; Coombs, 2000b).

## Distance Education Literature

While, as shown above, there has been a recent wave of articles on web accessibility in the library literature, the discussion of this subject in the context of distance education is rare. Contributions to the core distance education journals, such as *The American Journal of Distance Education*, *Journal of Instructional Science and Technology*, *Virtual University Journal*, *Online Chronicle of Distance Education and Communication*, and the *Journal of Library Services for Distance Education* do not reflect any concern about the accessibility of online resources for people with disabilities. The latter journal, which focuses on “issues and challenges of providing research/information services to students enrolled in formal post-secondary distance education,” is a case a point. Not a single article in the journal’s special theme issue (1997, Vol. 1, No. 1) about the “future of library services for off-campus/distance education,” which includes contributions solicited from “selected leaders in this field,” mentions the problems faced by people with disabilities in the virtual campus environment. Pertinent special-theme issues in other disciplines are not any different in this regard, such as the special issue on “Telecommunication, Distance Learning, and the World Wide Web” in *Technical Communication Quarterly* (1999, Vol. 8, No. 1). Again, not one of the contributions contains a single reference to accessibility-related questions. This includes the article by Gillette on “Pedagogy, architecture, and the virtual classroom,” in which the architectural metaphor of constructing a school building informs the discussion of instructional web-resources design, as well as the article by O’Sullivan on “Worlds within we teach: Issues for designing World Wide Web course material.”

Indeed, discussions of any type of disability-related topics are extremely rare in the distance-education literature. I could find only two such articles in the journals named in the previous paragraph: Olmstead (1997), in an article entitled “To level the playing field,” emphasizes that certain modes of telecommunications permit some people with disabilities to “expos[e] their talents without revealing their less accepted social traits.” Alamgir (2000) describes the programs offered by the new Bangladesh Open University, which was established to ensure educational facilities for “special and vulnerable groups.” Neither of the two authors addresses accessibility-related issues.

The fact that, with the few exceptions discussed in the following two paragraphs, disability-related access issues are not covered in the distance-education literature does not mean that questions about access to the online world are not addressed there at all. On the contrary, the terms “access” and “accessibility” are ubiquitous in the distance-education discourse. However, they carry different meanings—meanings that have nothing to do with barrier-free presentation of content. For example, Klemm and Utsumi (1997), in their discussion of the *Consortium for Affordable and Accessible Distance Education* (CAADE), point out that this organization’s mission is to promote emerging technologies in order “to increase access to educational opportunity ... wherever people are who must rely on distance education.” Note that the “telecommunication needs for underserved learners” are solely construed in terms of connectivity: “CAADE will develop and demonstrate high-performance electronic communications systems that combine the power of computers via telephone, local-area networks, low-to-medium speed terrestrial Internet and wireless telecommunications and digital satellites.” When Jones (1997) speaks about the need for access, she also has connectivity in mind. However, her plea for connectivity does not relate to the global communications infrastructure but, more narrowly, to the extension of access to online resources to off-campus students. “We must skillfully educate vendors about our programs, stressing the need for simplified connectivity and placing of information on the ‘anywhere’ desktop.” Barnard (1999) provides us with an example of yet another meaning of access. In his article on “Web accessible library resources for emerging virtual universities,” he equates “web accessible” with “available on the web.” With this notion of “access,” it does not matter to him whether course reserve materials are provided in HTML, straight text or image format: Any of these formats can provide “direct web accessibility.”

Only few publications address the problems that people with disabilities encounter in an online distance-education environment. Ommerborn (1998) provides us with what is probably the most in-depth treatment of distance education for people with disabilities. However, his work has a strong European focus, and it is not up-to-date with regard to modern web-based modes of instructional delivery. Similarly, the article by Valore and Diehl (1987), while of much interest from a historical perspective, predates the emergence of the present-day online environment. Miller et al. (1999), in an article describing the distance learning program at Cattanooga State Technical Community College, refer to the introduction of online courses as early as 1993, but they do not discuss the issue of accessibility of these courses for one of the targeted “niche” groups: students with disabilities. This leaves us with just a handful of papers and articles:

Stewart (1999) discusses legal and programmatic requirements that distance education providers are obliged to comply with. He asserts that “in asynchronous offerings such as web based courses the accessibility needs to be built into the product being offered, or an alternative must be offered that is comparable in content and access options.” Similarly, Harrison (1999) emphasizes that the development of Web-based educational resources must be based on universal design principles. “As an extension of the principle of universal education, we must become aware of principles of universal Web design.” The web must be accessible, and by this she means “that anyone using any kind of

Web browsing technology must be able to visit any site and get a full and complete understanding of the information as well as have the full and complete ability to interact with the site ...” In light of Harrison’s inclusion of interactivity in her definition of web accessibility, it does not come as a surprise that she also addresses the issue of web-based courseware, which she often finds to be full of barriers to students with special needs. Kessler and Keefe (1999) comment on the impact that new distance-education technology has on students with disability. They note that this impact “has not yet been fully assessed. For some, the advent of new communication technology is a liberating innovation; for others it remains a potential barrier to be overcome.” The authors recommend, among others, that “schools establish a policy that places high value on universal access and design.” In an article published in the *Chronicle of Higher Education*, Carnevale (1999) brought the issue of access to online courses for students with disabilities to the attention of the academic community at large. The author begins by pointing out that colleges and universities, in their scramble for a larger piece of the distance education pie, “are finding that they must include the virtual equivalent of wheelchair ramps when building their on-line classrooms.” Some educational institutions respond to this requirement by preparing their own accessibility guidelines or by attempting to educate their faculty about accessible web design. Other institutions are only slow to respond. The author cites the president of Disability Access and Information Support, who complains that Web-site creators “don’t always realize how important accessibility is.” A further reason for a slow response, according to Carnevale, is the uncertainty about what, exactly, is required by law. Carnevale, like the other authors referred to in this paragraph, does not provide any information that would indicate the extent to which, at the present, distance-education resources are accessible to people with disabilities.

### Web Site Accessibility Research

Thirteen studies known to this author have investigated the accessibility of post-secondary education web sites. All of them employed Bobby, an automated web-accessibility assessment tool, to collect the data. Five studies focused on library web pages: Schmetzke (in press) looked at the universities that, according to *U.S. News & World Report*, have the nation’s 24 most highly ranked schools of library and information science (SLIS). The data revealed that, on the average, 59% of main campus library web pages were accessible, while only 23% of SLIS web pages were free of Bobby-detected access barriers. Schmetzke (1999), who studied the web accessibility of campus and library web pages at the 13 four-year campuses within the University of Wisconsin system, found that, on the average, only 31% of the libraries’ top level pages (homepages plus the next layer of library pages linked to them) were free of major accessibility problems. A follow-up study, a year later, revealed a mild increase in the percentage of accessible pages to 40% (Schmetzke, 2000). The data varied dramatically from campus to campus: At four of the libraries included in the 2000 study, no web page was free of major accessibility problems; only one library had a web site with more than 80% of its pages void of major access barriers. General campus web site data, collected in the same studies, showed a slightly opposite trend—from 48% in 1999 down to 43% in 2000. Examining the colleges and universities on Yahoo’s list of “America’s 100 Most Wired Colleges,” Lilly and Van Fleet (1999) discovered that only 40% of the library home pages were accessible. They reported that two types of errors occurred most frequently: failure to provide alternative text for images and the lack of alternative text for image map hot-spots. Similar results were also revealed by a British study. Craven (2000) reported that 38 of the 103 tested university library home pages received Bobby approval, and that the majority of problems involved missing or inappropriately used alternative text.

Studies on the accessibility of other (non-library) academic web pages barely paint a rosier picture: A study within the University of



Wisconsin-Madison revealed that only 38% of the 101 departmental homepages evaluated with Bobby, an automated accessibility checker, were free of accessibility problems. After an additional, more stringent manual assessment, only a mere 14% passed as barrier-free (Accessibility & Technology, 2000). Hinn (1999) complemented Bobby-generated data with findings based on interviews and computer-facilitated focus groups involving student participants with disabilities. While not providing any quantitative data, she discusses in detail some of the major access barriers in Web-based learning environments. Guthrie (2000) examined the accessibility of Web sites of 80 colleges of communications and schools of journalism. She found that 21% of the homepages were void of major barriers. Flowers, Bray and Algozzine (1999), who evaluated the homepages of 89 special-education programs, reported that a mere 27% of these did not contain any accessibility problems, and that most of the problems found constituted major access barriers. They also discovered that the vast majority of accessibility errors (83%) were easy to correct. That web sites cannot be assumed to be accessible simply because of their disability-related content, or because the people who maintain them have disabilities themselves, was further confirmed by two other studies: Rowland (1999) reported that only 45% of University Affiliated Program (UAP) homepages were barrier-free-despite the fact that UAP's mission involves, among others, service, technical assistance and information dissemination to the disability community. Similarly, a study by the National Center for the Dissemination of Disability Research (1998), involving the websites of 213 programs funded by this agency, showed that only 43% of the homepages were accessible.

Only one study provided information on the accessibility of distance-education sites: Rowland and Smith (1999), who collected accessibility data from a random sample of colleges, universities and online learning institutions from all 50 states (n=400), found only 22% of the home pages to be accessible. In a follow-up study, Walden, Rowland and Bohman (2000) focused on home pages that served as "entry points" for distance-education students. These data, collected in November 1999, revealed similar results. Only a mere 24% of these pages were void of major access barriers.

## RESEARCH FOCUS OF THIS STUDY

The accessibility data available at the present indicate that web sites tend to be fraught with access barriers. At the very best, the average accessibility of web pages per site was found to be 59%. More typically, the average accessibility figures fall between 30% and 40%. With 22%, the percentage of barrier-free pages is particularly low for the one set of data available on distance-education sites. The findings by Schmetzke (1999, 2000), which together provide the only longitudinal data currently available, show some variation over time in web accessibility and thus point to the possibility that data that are one or two years old may have outlived their currency. With the rapid changes taking place in web technology, web accessibility in American libraries nationwide may differ from what the data suggested just a year ago.

The purpose of this study is to provide current data on the accessibility of distance-education web sites. Unlike the study by Walden, Rowland and Bohman, whose 1999 data reflect only the accessibility of home pages, this study covers homepages plus the layer of web pages directly linked to them. Furthermore, two different sets of data are included: Similar to the Walden, Rowland and Bohman study, set 1 includes web pages of distance-education providers-web pages that not only function as pathways to the other web-based resources

mentioned above, but that also serve as a recruiting tool for prospective students. More specifically, Set 1 includes the web sites of 219 post-secondary distance education institutions listed in Marcie Kisner Thorson's (2000) book "Campus-free College Degrees," a "guide to accredited college degrees through distance learning." The URLs used for this study are not necessarily identical to those provided in Thorson's guide. Every effort was made to select the URLs most closely associated with the pertinent distance-education units. Set 2 includes the web sites of twelve major regional or national North American organizations concerned with distance learning, such as the American Center for the Study of Distance Education (ACSDE) and the Distance Education and Training Council (DETC). These sites were selected through a search-engine query in Altavista. Accessibility data derived from Set 2 are used to gauge the level of awareness in these organizations. If it turns out that the institutions that provide leadership in distance education do not put up accessible web sites, one must assume that there is either a lack of awareness about the issue or a lack of recognition concerning its importance.

## RESEARCH METHODOLOGY

### Evaluation Tool

The accessibility of web pages was evaluated with Bobby, a tool created by the Center for Applied Special Technology [17]. Bobby checks for compliance with the WAI's *Web Content Accessibility Guidelines and Techniques* (see above). The downloadable version of Bobby, which runs as an application on a personal computer, is capable of testing larger sets of web pages on a given web site. As Bobby's creators' point out, "it is ideal for large scale accessibility testing"[18]. For each page checked, Bobby provides information pertaining to the type, number, and location of accessibility errors-both minor and major ones. Bobby also issues a summary report for each set of web pages. Web pages that contain any major ("Priority 1") error do not receive Bobby's approval.

Site accessibility was determined with the downloadable versions of Bobbie. For the sites listed by Thorson (set 1), I used Bobbie 3.1.1, which, unlike the most recent release, Bobby 3.2, also provides summaries of error-type data for the whole set. For the evaluation of the twelve regional/national distance-education sites (set 2), I used Bobbie 3.2. Several trial runs revealed that both program versions provide almost identical results as far as "Priority 1" errors are concerned.

As Bobby's creators freely admit, their product is not a perfect tool. While Bobby checks for compliance with the W3C-WAI's *Web Content Accessibility Guidelines and Techniques* for html documents, it automatically checks for compliance with only a subset of these. For the features not included in its automatic test, Bobby prompts the user to perform a "manual" check. Bobby is also unable to check for the accessibility of script (such as Javascript) or script-generated content. Some features can only be partially checked with Bobby. When encountering images, for example, Bobby will not report an error as long as some alternative text is provided-no matter how meaningless or non-descriptive this text may be. Thus, for various reasons, reliance on Bobby's automatic checking facility alone is prone to produce some falsely positive (error-free) findings.

In addition to falsely positive results, Bobby, on occasion, also produces falsely negative results (reported errors where none exist), as I found

out during my earlier studies. For example, pages that, at the very beginning, provide a "text-only version" link may not get Bobby's approval. Bobby simply checks the graphics versions for violation of accessible design principles. If it discovers a violation, Bobby considers this page to be inaccessible-regardless of how perfectly accessible the text-only version may be.

Another problematic feature of Bobby is its inability to distinguish between degrees of impact between different manifestations of the same error. For example, a bullet icon without an ALT tag (containing alternative text) registers as equal in status (i.e., as being a "Priority 1" error) to that of an image (also without an ALT tag) that is packed with crucial information. Similarly, Bobby may classify different types of accessibility errors as equal in severity even if the barriers they constitute differ to a significant degree. For example, the lack of alternative text associated with a purely decorative image registers as an error equal in need of correction to the lack of frame labels in multi-frame pages.

Despite its shortcomings, Bobby is a good evaluation tool in studies like this, where the accessibility of thousands of individual web pages are evaluated and a rough measure of accessibility suffices. In fact, all but three of the accessibility studies listed in the previous section rely exclusively on Bobby's automatically generated data. Only three small-scale investigations, Hinn's study of barriers in Web-base learning environments (n unknown), the study of the departmental homepages on the University of Wisconsin-Madison campus (n=101) and the British study of library homepages (n=103), employ Bobby's automated checking capability as well as human judgment.

## Statistical Methods

Since the goal of this study is primarily to gauge web accessibility at two selected sets of distance education sites, only methods of descriptive statistics are employed. Specifically, the following two statistical measures are provided for each set: average percentage of Bobby-approved web pages and average number of errors per page. For set 1, the relative frequency of specific accessibility errors is also computed. All descriptive measures were calculated with the help of a spreadsheet (Microsoft Excel 2000).

## Results

The results of this accessibility study revealed major accessibility problems (referred to as "Priority 1" errors by Bobby) associated with both sets: Of the total of 219 sites included in set 1, Bobby found only 15.1% of the homepages to be free of major accessibility errors. When the pages directly linked to the 219 homepages were included (which made for a total of 3,366 pages), Bobby found 23.3% of the pages to be accessible. The average number of Priority 1 accessibility errors per page was very similar for both the homepages and the wider set: The homepages contained 8.6 major accessibility problems per page; for the wider set, the average number of Priority 1 accessibility errors was 7.8.

The vast majority of accessibility errors (set 1) detected by the automated Bobby checker fall into two categories: images without alternative text (81%) and image map hotspots without alternative text (16%). About 2% of the errors involved frames: frames without title (1.7%) or

not usable without a frames-capable browser (.2%). The remaining three types of reported errors occurred with a frequency of less than 1%: no redundant text links for all server-side images (.2%), image-type button in form without alternative text (.4%) and applet without alternative text (.4%).

The web pages of distance-education organizations (set 2) were not paragons of virtue, either, as far accessibility is concerned. Only one of the 12 home pages received Bobby approval. When the pages directly linked to the homepages were included (wider set), 18% were found to be free of major accessibility problems. At five web sites, none of the pages received Bobby approval; at only one web site were all the pages accessible. The average number of major accessibility problems per page was 5.5 for the wider set, ranging from 0 to 29. Detailed information about the accessibility of each of the twelve sites is provided in the appendix.

## Discussion

The studies reviewed earlier showed web accessibility, as determined by the automated Bobby facility, to vary between 21% and 59%. The Walden, Rowland and Bohman study, the only one specifically looking at distance education sites, revealed that, with 24%, home page accessibility was at the low end of this range. This study further confirms these findings. In fact, with a Bobby approval of only 15%, the homepages included in this study are even less accessible than those included in the Walden, Rowland and Bowman study. While, with a Bobby approval of 23%, the accessibility for the wider set (homepages plus the pages directly linked to them) was slightly higher, it remains below any of the comparable data for general campus and library sites, which were mostly in the 30% to 40% range.

The error analysis reveals that the vast majority, about 97%, of the barriers found in web pages results from the designers' neglect to provide alternative text for images and image map hot-spots. This finding is relevant because these two types of errors are easily fixed. It certainly would not require a major re-design of web pages, or an advanced skill level in html, to insert the alternative text tags.

The results of the error analysis in this study confirm the tendency reported by Flowers, Bray and Algozzine and by Lilly and Van Fleet. However, the figures reported by these authors-the relative frequencies of missing alternative text for images and image map hot-spots-are not quite as high. Most likely, the reason for this lies in the way errors were counted. While the other researcher counted the pages containing a certain type of error, I counted the number of times a certain type of error occurred. If, for example, an image without an ALT tag occurred 30 times on the same page, Lilly and Van Fleet would state that one page was affected by this error, whereas I would record that it occurred 30 times.

The low accessibility of most of the twelve regional/national distance education organization sites came as a surprise. With an average Bobby-approval rate of only 18%, these sites tended to contain even more barriers than the sites of distance-education providers included in set 1. In six, or 50%, of the cases, none of the pages were free of access problems. Nine, or 75%, of the web sites had a Bobby-approval rate below 10%. Only one organization, the American Distance Education Consortium (ADEC), maintained a fully accessible site. This is unlikely to be a coincident: ADEC, which describes itself as "the foremost leader in providing and creating access to customer driven distance education in

its mission areas” does not define access solely in terms of connectivity. An easily discernable link on its homepage leads directly to a lengthy resources page dedicated to disability-related accessibility issues [19].

The ADEC case lends support to the assumption that there is a direct connection between the accessibility of an organization’s web site and its awareness about accessible web design. It is reasonable to assume that the opposite also holds true: The fact that nine of the twelve distance-education organization included in set 2 maintain highly inaccessible web sites cannot solely be attributed to web designers’ attitudes, but is it likely to reflect a general lack of awareness about accessible design within these organizations themselves. One can thus further assume that these distance education organizations are unlikely to promote accessible design of online resources within their sphere of influence. As colleges and universities, grappling with the development of new online programs, take their guidance from these organizations, they will not be steered towards the creation of a virtual learning environment in which all students can thrive.

## CONCLUSION

When Carnevale, in his 1999 article in the *Chronicle of Higher Education*, stated that colleges and universities “are finding that they must include the virtual equivalent of wheelchair ramps when building their on-line classrooms,” he may have induced some hope that distance education providers would jump into action and would eliminate at least the barriers in their main virtual corridors: their top-level web pages. After all, of the various online resources that constitute virtual learning environments, web pages are among those that can be made accessible relatively easily. As Schmetzke (in press) points out, a wide variety of resources—web sites, books, quick tips, online tutorials, and workshops—are readily available to anyone who wishes to create accessible web pages. Yet, over a year after the publication of Carnevale’s article, only 15% of the distance-education providers included in this study have put up barrier-free home pages.

Why are the web sites of distance-education providers so inaccessible? Why do they not fix them? There may be a number of reasons for this: One reason may be that those involved in setting up distance education programs are so overwhelmed dealing with the various technical and administrative aspects of the job that concerns for access for people with print disabilities, if such concerns are on the radar screen at all, have low priority. A second reason may have to do with the invisibility of the issue. Students with visible disabilities, such as people who are blind or who are using wheelchairs, are noticed in the physical campus environment. Anyone observing a person in a wheelchair attempting to negotiate a sidewalk curb will quickly realize the need for a curb cut. In the online environment, the needs of people with disabilities tend to go unobserved, and thus unacknowledged. The planners of online classrooms are unlikely to meet face-to-face with blind individuals as they link to course web sites only to find most information to be provided in an inaccessible image format. Distance-education planners and program developers are not exposed to the persuasive force that comes from this type of direct observation.

This study suggests a third reason for the low degree of inaccessibility of distance-education sites: unawareness about the issue among those institutions who assume a leadership function. When organizations, such as the United States Distance Learning Association (USDLA), whose purpose is “to promote the development and application of distance learning for education and training” and which considers itself to be “the leading source of information and recommendations for government agencies, Congress, industry and those entering into the

development of distance learning programs” puts up a home page that is blatantly non-compliant with the W3C/WAI’s Web Content Accessibility Guidelines by failing to provide alternative text for graphical elements (causing my pwWebSpeak browser to render important information as a string of unspecified links and images), it is difficult to take this as anything but an indication that the leaders and trainers in the field are unaware of the need for universal design [20]. Or when the University Continuing Education Association-which is “committed to making higher education available to everyone,” which strives “to ensure that programs and services address societal needs and economic trends,” and which seeks to advance “new distance education technologies that expand the reach of colleges and universities to diverse student populations”-selects a frame-based design for its homepage that contains neither meaningful frame titles nor a no-frames option, one has to worry about the representation of people with disabilities in this organization’s endeavors [21].

An analysis of distance education policies provides further support for the hypothesis that lack of awareness among the leadership is partially responsible for the many access barriers found at the majority of web sites of distance-education providers. Preliminary findings by Schmetzke (in progress) indicate that the distance-education policies promulgated by colleges and universities are heavily influenced by guidelines of national associations, especially the “Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs” developed by the Western Interstate Commission for Higher Education (WICHE) and the “Guidelines for Distance Education” issued by the North Central Association (NCA) Commission on Institutions of Higher Education [22,23]. Neither of these two documents, which have received the endorsement of all U.S. regional accrediting commissions, addresses the importance of universally designed instructional resources. It thus does not come as a surprise that the vast majority of policies adopted by individual colleges and universities-the one developed by California Community Colleges being a rare exception-are equally silent on this issue.

Institutions of higher education are at the crossroads: They can either extent their commitment to inclusive learning by ensuring that the web-based information technology into which they currently invest so heavily is accessible to all, or they can continue to ignore the issue and create a digital divide that pushes people with print disabilities towards the fringes of the new economy. If no changes occur, the consequences will be drastic for all individuals with print disabilities-for students as well as faculty and staff. Perhaps, a combination of education (awareness raising articles etc.), advocacy for inclusive policies at all levels (from leadership organizations down to individual colleges), and research pertaining to the accessibility of learning resources will gradually sway distance-education planners to support the cause. Perhaps, the recently released Access Board standards (under Section 508) will do for cyberspace what the ADA accomplished for the physical environment. Perhaps, as the California example suggests, it will take further legal action-complaints to the Office of Civil Rights and suits of the kind recently filed by the National Federal of the Blind against AOL-to shake things up. Let us hope that it is for ethical and economic reasons, rather than through litigation, that individuals with print disabilities will soon be able to take advantage of the new opportunities that distance education could, potentially, provide to everyone.

## APPENDIX

<u>Distance-Education Organization</u>	<u>Bobby-approved pages (%)</u>	<u>Average number of errors per page</u>
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<b>American Center for the Study of Distance Education (ACSDE)</b>	<b>6</b>	<b>1.3</b>
<b>American Distance Education Consortium (ADEC)</b>	<b>100</b>	<b>0.0</b>
<b>Asynchronous Learning Networks (ALN)</b>	<b>0</b>	<b>8.2</b>
<b>Canadian Association for Distance Education (CADE)</b>	<b>50</b>	<b>1.0</b>
<b>Commonwealth of Learning (COL)</b>	<b>4</b>	<b>7.6</b>
<b>Distance Education Clearing House</b>	<b>6</b>	<b>3.5</b>
<b>Distance Education and Clearing Council (DETC)</b>	<b>0</b>	<b>1.4</b>
<b>Eduspear.com--Distance Learning</b>	<b>0</b>	<b>5.9</b>
<b>Mid-Atlantic Network for Teaching Learning Enterprises (MANTLE)</b>	<b>0</b>	<b>1.0</b>
<b>TeleLearning Network of Centres of Excellence</b>	<b>45</b>	<b>2.9</b>
<b>University Continuing Education Association</b>	<b>0</b>	<b>3.1</b>
<b>United States Distance Learning Association (USDLA)</b>	<b>5</b>	<b>29.1</b>
<b>Average (combined)</b>	<b>18</b>	<b>5.5</b>

## NOTES

[1] <http://www.access-board.gov/about/Rehab%20Act%20Amend-508.htm>

[2] <http://www.access-board.gov/news/508-final.htm>

[3] <http://www.access-board.gov/sec508/Section%20508%20Questions%20and%20Answers.htm#3>

[4] <http://www.usdoj.gov/crt/508/archive/deptofed.html>

[5] <http://www.sjsu.edu/pubs/webpolicy/>

[6] <http://web.mit.edu/ada/waccess.html>

[7] <http://www.regis.edu/disability/webaccessibility.htm#accessibilitypolicy>

[8] <http://www.uwstout.edu/lib/litc/report.htm>

[9] <http://www.wisc.edu/wiscinfo/policy/wwwap.html>

[10] <http://www.uwsp.edu/it/policies/adapolicy.htm>

[11] <http://www.uww.edu/policy/access/index.html#policy>

[12] **American National Standard for Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People (ANSI A117.1 1961/1980/1986); Minimum Guidelines and Requirements for Accessible Design (MGRAD 1982); Uniform Federal Accessibility Standard (UFAS 194); and ADA Accessibility Guidelines for Buildings and Facilities (ADAAG 1992).**

[13] <http://www.webable.com/w4papers.html>

[14] <http://www.w3.org/>

[15] <http://www.w3.org/TR/WCAG10/>

[16] <http://www.w3.org/TR/1999/WAI-WEBCONTENT-TECHS-19990505/>

[17] <http://www.cast.org/bobby/>

[18] <http://www.cast.org/bobby/docs.html>

[19] <http://www.adec.edu/>

[20] <http://www.usdla.org/>

[21] <http://www.nucea.edu/>

[22] <http://www.wiche.edu/Telecom/projects/balancing/principles.htm>

[23] <http://www.ncahigherlearningcommission.org/resources/guidelines/gdistance.html>

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