

FROM BARRIERS TO BRIDGES: APPROACHING ACCESSIBILITY IN COURSE DESIGN

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Abstract

The value of accessibility is internationally recognized, and the World Wide Web Consortium (W3C) has standardized guidelines for accessibility. However, it remains a challenge to offer rich multimedia as accessible content when institutional resources are limited. And, in the absence of a student who has a legal right to accommodations, what is the responsibility of an educator with respect to designing a fully accessible course, especially one that is totally online? This paper will review recent legal cases and present techniques of turning barriers into bridges by utilizing features of universal design.

Introduction

Rich use of multimedia can enhance online learning by increasing learner engagement and addressing the needs of learners with multiple learning styles. However, incorporation of multimedia without consideration of alternative, text-based formats can create barriers to information access by learners with disabilities or who are second language learners. Each inaccessible content item or tool is a rock that obstructs successful completion of learning objectives or competencies. Effective use of information communication technologies, however, can assemble these rocks into bridges to make previously inaccessible content accessible to all users.

Today's graduating high school seniors were *born digital* (Gasser & Palfrey, 2008), but this does not mean that the post-secondary courses they take were either born digital or *born accessible* (Goldberg & Rothberg, 2013). According to an Educause webinar (2013), Goldberg and Rothberg of the National Center for Accessible Media pointed out, "The present that we're starting with is not paper." Many forms of digital content exist and publishers are making digital learning materials available, including the option of purchasing an e-textbook. While this does not guarantee total accessibility, it does increase the likelihood that accessible content and activity options will be available at the time a course is being designed. It is important to ensure that all materials are available to all learners in a timely manner, and that means designing with accessibility in mind rather than retrofitting materials in a hurry and at great expense when the need arises. As Goldberg and Rothberg affirmed, designing a course that is *born accessible* will be "less troublesome, less expensive, and of course available from the very beginning [of a class]."

A litmus test for course accessibility, including online courses, might be this:

All learners can easily navigate online content, access all information, and complete all activities in the course in order to meet learning objectives or competencies.

In other words, course design includes:

- Accurate closed captioning or, for non-synchronized content, transcripts that allow a learner who cannot hear access to all information conveyed primarily through audio means.
- Text or audio description of images and video that allow a learner who cannot see access to all information conveyed primarily through visual means.
- Navigation that facilitates movement through the course for all learners, including those with motor impairments.

How do educational institutions find the balance between creating content that any student can access and designing an accessible course when resources are limited? And, in the absence of a student who has a legal right to accommodations, what is the moral or legal responsibility of an educator with respect to designing a fully accessible course? This paper will promote digital accessibility by:

1. Reviewing key features of guidelines and legislation related to the accessibility of information communication technologies;
2. Discussing recent legal cases in the United States initiated by students who claimed that they did not have full access to information;
3. Presenting basic features of universal design that can enhance accessibility; and
4. Outlining concrete approaches to accessibility that are easily achieved even when resources are limited.

Guidelines and Legislation on Information Communication Technologies

The United Nations Convention on the Rights of Person with Disabilities (2006) affirmed that

To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, ...to information and communications, including information and communications technologies and systems. (Article 9)

and that these measures “shall include the identification and elimination of obstacles and barriers to accessibility” (Article 9).

Awareness of and attention to accessibility varies widely. The value of accessibility is internationally recognized, and the World Wide Web Consortium (W3C) has standardized guidelines for Web accessibility, most recently in 2008. In addition, many countries mandate conformance to the W3C’s Web Content Accessibility

Guidelines (WCAG) or have national laws that specify the conditions and the degrees to which information must be accessible. Putting these guidelines into practice, however, continues to create challenges in an educational environment.

Web Content Accessibility Guidelines 2.0

According to the World Wide Web Consortium (W3C), Web accessibility entails that “people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.” The current Web Content Accessibility Guidelines (WCAG) 2.0 offers three levels of conformance: A, AA, and AAA (2008, sec. WCAG 2.0 Layers of Guidance, para. 1). The W3C realistically notes that “even content that conforms at the highest level (AAA) will not be accessible to individuals with all types, degrees, or combinations of disability, particularly in the cognitive language and learning areas” (para. 3). The guidelines are organized into four areas.

1. Perceivable – Information and user interface components must be presentable to users in ways they can perceive. Several items in this category stipulate that *text alternatives* be provided for non-text content so that all users have access to *equivalent information*. This includes provision of closed captions for audio content or audio description for video content.
2. Operable – User interface components and navigation must be operable.
3. Understandable – Information and the operation of user interface must be understandable.
4. Robust – Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

The bottom line: Best practices for achieving Web accessibility promoted by the WCAG 2.0 are also best practices in good Web design.

The U.S. Rehabilitation Act of 1973: Section 504

Section 504 of the Rehabilitation Act of 1973 specifies:

No otherwise qualified individual with a disability in the United States, shall, solely by reason of her or his disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. (2009, para. 1)

Educational institutions that receive federal funds for any reason are therefore required to adhere to Section 504. Note that Section 504 precedes ubiquitous use of the Web.

The bottom line: Educational programs must be accessible.

The Americans with Disabilities Act (ADA) of 1990

The Americans with Disabilities Act of 1990, amended in 2008 and commonly referred to as the ADA, is landmark legislation that prevents discrimination on the

basis of disability. Such discrimination can include “the discriminatory effects of...communication barriers” (Section 12101). As Title II of the ADA applies to public entities, any institution that receives federal funds, e.g., even through a federal research grant, must abide by the provisions of the ADA.

The bottom line: The ADA chapter of U.S. Title 42 on The Public Health and Welfare is identified as “Equal Opportunity for Individuals with Disabilities.” This mandate for equal opportunity explicitly includes information communication technologies.

The U.S. Rehabilitation Act of 1973 (amended 1998): Section 508

Section 508 of the U.S. Rehabilitation Act of 1973 was amended in 1998 to require that Federal agencies—or organizations receiving federal funds—provide access to “electronic and information technology” unless such access would cause an “undue burden” (para. 1). In that event, the organization must offer “an alternative means of access that allows the individual to use the information and data.” The meaning of “undue burden” as it pertains to the accessibility of course materials was clarified in a court case that will be summarized below.

Section 508 includes 16 standards that pertain to the accessibility of “Web-based intranet and internet information and applications.” The first two are of particular interest to online course design:

- (a) A text equivalent for every non-text element shall be provided (e.g., via “alt,” “longdesc,” or in element content).
- (b) Equivalent alternatives for any multimedia presentation should be synchronized with the presentation.

The bottom line: Information must be accessible in some format unless this causes an “undue burden.”

The Individuals with Disabilities Education Act (IDEA) of 1990

The Individuals with Disabilities Education Act (IDEA) of 1990 mandates that all states must adopt the National Instructional Materials Accessibility Standard (NIMAS) “to help increase the availability and timely delivery of print instructional materials in accessible formats to blind or other persons with print disabilities in elementary and secondary schools” (2006, p. 300). While this legislation is directed at K-12, both of those conditions, namely “availability” and “timely delivery,” have played a role in recent lawsuits brought against institutions of higher education by students with disabilities.

The bottom line: State and local agencies are required to provide accessible materials to all students who need them.

What is an “Undue Burden”? Office of Civil Rights Letter to CSU

As cited by Coombs (2010), a letter from the Office of Civil Rights to California State University Los Angeles helped clarify the meaning of “undue burden.”

When a public institution selects software programs and/or hardware equipment that are not adaptable for access by persons with disabilities, the subsequent substantial expense of providing access is not generally regarded as an undue burden when such cost could have been significantly reduced by considering the issue of accessibility at the time of the initial selection. (pp. 14-15)

The bottom line: Get it right the first time.

The 21st Century Communications and Video Accessibility Act of 2010

The 21st Century Communications and Video Accessibility Act of 2010 updates federal communications law “to increase the access of persons with disabilities to modern communications” with respect to “21st century technologies, including new digital, broadband, and mobile innovations” (para. 1). Title II, which addresses video programming, restores and expands the rules on “video description” that were first proposed in 2000 but dropped with a change in government priorities. Video description is now more commonly referred to as “audio description” and involves providing audio narration of visual content.

The bottom line: Emerging communications technologies must be accessible.

Legal Challenges in the United States: Barriers to Learning

While as an aggregate, U.S. legislation prohibits discrimination and demands accessibility for all; conformance to these mandates has proven to be a challenge in higher education. In the last few years, lawsuits against institutions of higher education due to inaccessible technologies have clarified the reach of the law and specified ways in which technologies must be made accessible, including timely access. While the institutions listed below have been identified in lawsuits, it is probable that any institution of higher education in the United States offering courses that are not *born accessible* could be similarly charged.

2011: Penn State University

In 2010 The National Federation of the Blind (NFB) brought a suit against Penn State University claiming “pervasive and ongoing discrimination” caused by inaccessible technologies, including learning management system tools and departmental Web sites (Parry). The suit was settled in 2011 without admission of wrongdoing, with Penn State agreeing to “a strategy to make all electronic and information technology systems used on its campuses fully accessible to blind students, faculty, and staff” (Danielsen, 2011, para. 2).

2012: Florida State University

In 2012, a settlement was reached between Florida State University and two blind students who brought suit due to inaccessible technologies, including software needed for a math class and classroom clickers. Although the university did not admit wrongdoing, it agreed to pay each student \$75,000 and “to continue its efforts to make courses accessible to all students” (Danielsen, 2012, para. 3).

2013: University of Montana

In 2012, blind students filed a complaint against the University of Montana due to inaccessible technologies. Inaccessible content included scans of text that could not be read by screen readers, videos that were not captioned, and library database materials. Inaccessible tools included live chat and discussion board functions in the learning management system and classroom clickers. As reported by National Federation of the Blind President Marc Maurer, in 2013 the NFB secured an agreement that the University of Montana would address “the systemic problems of inaccessible technology on campus” (2013, para. 36).

2013: Louisiana Tech University

In 2013, the U.S. Department of Justice settled with Louisiana Tech University over violations of the ADA (U. S. Department of Justice, 2013). Because online learning software was not accessible, a blind student did not have access to course materials for nearly a month into the semester. The settlement stipulated that the University must comply with WCAG 2.0 standards at Level AA and that ADA training be provided for faculty and administrators.

2014: Miami University of Ohio

A blind zoology student who intends to become a veterinarian filed a suit against Miami University of Ohio (Dudley v. Miami University, 2014) for failing to provide “timely and adequate access” to course information and for utilizing a learning management system and assignment software that were not accessible. The student specified that she did not receive information in her preferred format, namely as Braille textbooks and tactile graphics. This case was not decided or settled at the time this paper was submitted, but may provide insight into the distinction between the provision of information in a format that is “accessible” but not “preferred” by a student.

Designing Courses That Are Born Accessible: Universal Design

Ron Mace, who developed polio as a child, had to be carried into inaccessible buildings when he was completing his architecture degree. He introduced the notion of *universal design* with respect to buildings, and is had since been generalized to include “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Mace, 2008).

Electronic Curb Cuts in Course Design

One aspect of accessible environmental design is the “curb-cut,” a dip in curbs that allows individuals in wheelchairs to more easily cross streets. Of course, curb cuts also benefit individuals on crutches, pushing strollers, riding bikes or skateboards, or on skates. Similarly, elements of digital design that are intended to increase access to persons with disabilities benefit a wider audience as well. For example, closed captions can be helpful to second language learners, those who speak a different dialect, those who prefer to access information through a

text rather than an auditory channel, or those unfamiliar with some of the vocabulary of the audio narration. Similarly, alt tags or audio description can help reinforce what is important in a visual image. This is one reason why it is better to design courses for universal access rather than needing to retrofit them when the need arises. Truly accessible courses can improve educational outcomes for all students since they address those with different learning styles and different needs.

Universal Design for Visual Impairments

A number of simple design elements can help make visual content accessible to learners with limited vision. Design principles that make content accessible to students reading screen readers benefit everyone, including non-native speakers, those with an auditory (as opposed to more visual) learning style, and those with “senior” eyes.

1. Organization is clean and consistent, with predictable placement of elements on multiple pages.
2. Images, including graphs and charts, are captioned or described using alt tags or long description.
3. Headings are identified with heading levels (e.g., in html or Word) rather than by changing the font. This enables learners using a screen reader to tab from one heading to another.
4. Tables are used only for data, not for layout, and table columns and rows are identified by headings.
5. Text is searchable and can be read with a screen reader; scans of text as pdf images cannot necessarily be read as text.
6. Text color is not the only method used to convey information.
7. Use of images that do not contribute to content understanding is avoided.
8. Links are described, e.g., [ICICTE home page](#) rather than www.icicte.org, or worse yet, “you can access the ICICTE home page [here](#).” A learner using a screen reader can tab from one link to another, but tabbing is not very helpful when all the learner hears is “here.”
9. Good contrast distinguishes text from background.
10. Fonts are clear enough and large enough to be easily read; 12 pt. is usually a good choice. Resizable fonts give the learner more control to personalize the environment.
11. Audio narration of important visual elements is provided. This will be further discussed below.

Universal Design for Hearing Impairments

Good design choices can help make auditory content accessible to learners with limited hearing. Captioning and transcripts also assist non-native speakers, those who speak different dialects, those with a reading/writing (as opposed to auditory) learning style, and those with “senior” ears.

1. Auditory content is presented in text format. For example, a transcript is provided of an audio recording or closed captions are provided that synchronize with a video recording. A narrated PowerPoint presentation can also contain information that goes beyond what is included in the bullets; for all students to have access to that information, a transcript should be provided for each narrated slide.
2. Closed captions are searchable, so learners can control their movement through long pieces of content.
3. Commercial content should not only meet course needs but also contain accurate captions. It's much easier to choose captioned content from the beginning instead of needing to caption content to meet an emergency need.
4. If a lecture capture system is used, it should be one that allows for captioning.

Universal Design for Motor Impairments

Designing a course so that it is easy to navigate improves everyone's experience, but can really make a difference for learners with motor impairments, including temporary impairments like a broken arm, carpal tunnel syndrome, or "senior" bones.

1. Streamline movement necessary to navigate pages.
2. Minimize the need for scrollbars by limiting the size of a page or elements on a page. For example, it should not be necessary to scroll vertically and horizontally in order to view an image; instead, resize the image so it can be viewed on a single screen.
3. Identify all titles, headings, and links so that navigation is not mouse dependent.

Universal Design for Cognitive Impairments

Many learners have cognitive impairments that are not obvious to other course participants but which may affect their ability to complete a course successfully, e.g., learners with learning disabilities. Making content available in multiple formats, e.g., through text, image, audio, and video, can increase the likelihood that all learners can access information in the specific way that they find most useful. In addition, avoiding distractions in design helps all students focus.

1. Make sure navigation is consistent.
2. Break up long blocks of text with headings, paragraphs, and white space.
3. Provide adequate descriptions of visual elements so that it is clear what is important.
4. Avoid distracting elements like blinking or buzzing text and images. These can also trigger seizures.

Concrete Approaches to Making Content Accessible: Building Bridges

Given the advantages and benefits of accessible design, how can an institution or instructor ensure that all content is accessible when resources are limited and time is short? Good intentions and a belief in creating accessible content are a start, but realistically it may be necessary to balance the need for accessibility with the costs of accessibility in making decisions. At some institutions, an office of disability services is only able to assist with providing accessible content when a student with a disability is registered and needs access to a particular class. Jillian Jevack brilliantly conveyed this dilemma in a skit featuring a professor, a dean, and the director of the Office of Accessibility (Varonis, Johanyak, & Jevack, 2013.). All have good intentions, but no one takes responsibility for making content accessible. What resources can a well-meaning instructor utilize in retrofitting a class that has not been born accessible? Norm Coombs (2010), the CEO of the non-profit Equal Access to Software and Information, which provides online training on accessible information technologies, comments “Creating online content that is accessible to students with disabilities is much easier—and probably far less expensive—than people fear” (p. x).

Fortunately, more content providers are becoming aware of accessibility issues and technologies that aid with achieving accessibility are becoming more readily available. This offers numerous options, many of which have no cost except human effort.

1. One non-profit organization, the [Center for Applied Special Technology \(CAST\)](#), provides free resources and an online book creator to assist in making content accessible for all grade levels.
2. The [Mathematics eText Research Center](#) provides resources for making math accessible.
3. The [National Center for Accessible Media](#) offers guidelines for making educational software and websites accessible, including for mobile access.
4. The [Open Educational Resources \(OER\) Commons](#) includes a repository of accessible media, including science content.

Choosing Accessible Ebook Reader Content

Traditionally, publishers have generated books, and non-profit organizations or individuals work to make those books accessible. New standards for Ebooks will help ensure accessibility for everyone, cross platform, and allow instructors to choose accessible Ebook Reader content for their courses. These standards include those of two open source projects:

1. The International Digital Publishing Forum’s [EPUB 3](#); and
2. The Digital Accessible Information System (DAISY) Consortium’s [DAISY 3](#).

Captioning and Transcriptions of Audio Content

It is possible to have video professionally captioned if funds allow, even in multiple languages ([dotsub](#) is one such online fee-based service). Recently, several options have become available that enable the rest of us to choose captioned videos or caption videos ourselves. In addition, there are a number of options for searching for material that is already captioned.

1. Search for captioned videos on youtube by introducing the sequence, “cc” after the search terms. This will produce a list of youtube videos that have not merely been machine captioned. For example, searching for “Oedipus, cc” will result in a list of captioned youtube videos about Oedipus and allow selection of an accessible version for a course.
2. The U.S. non-profit Public Broadcasting System includes [video resources for educational use](#), including over 3000 appropriate for higher education. Each resource is identified as to the degree of accessibility.
3. On an Apple, the Maverick operating system allows the automatic creation of a reasonably accurate transcript.
 - a. Open the TextEdit application; select “Edit,” and then “Start Dictation.” The transcript will need to be reviewed by human eyes to add punctuation and correct errors, but it is not necessary to train the software on a specific voice in order to use it successfully.
 - b. The transcript can also be uploaded to youtube and automatically synchronized with user-provided content in order to create closed captions.
4. [Amara](#) is a new crowd sourcing service that allows individuals to create and share closed captioning for videos, even those they have not created themselves. It is possible to upload a prepared transcript or create a transcript on the fly and then edit how it synchronizes with the video. It is also possible to search for videos that others have captioned and to filter for the language of the captions.

Text Description of Visual Content

It is possible to easily add alt tags or descriptions to visual content created in an html, Microsoft Office Suite, Apple iWork, or an Adobe pdf document, and all include built-in accessibility checkers. In addition, additional tools for text description have recently been made available.

1. The Digital Image and Graphic Resources for Accessible Materials (DIAGRAM) Center has introduced an open-source web-based tool for describing images in DAISY books. This tool, known as the [Poet image description tool](#), allows users to upload any DAISY 3 book file and then follow prompts to describe each image; these descriptions can be accessed by assistive technologies.
2. Apple’s iBook author includes a widget that prompts for description of images.

Audio Description of Visual Content

Audio description (also called *video description* or *visual description*) is an emerging technology to help ensure that learners with visual disabilities have access to information not otherwise conveyed through an auditory channel. For example, a film might include dialogue, but it might also include important visual information (a furtive glance across a smoke-filled room, for example) that contributes to the total impact.

1. The American Council of the Blind maintains a [database of media with audio description](#).
2. The Smith-Kettlewell Video Description Research and Development Center (VDRDC) offers a new, free crowdsourcing service that allows individuals to register and [provide audio description for youtube videos: http://youdescribe.ski.org/rel/](#). Your audio description is attached to the video but can only be played on the youdescribe website, which can be linked. This is a great option when the video you really want to use has inadequate or inaccurate machine captioning.

Verify Your Work!

A number of online sites allow verification of the accessibility of Web pages and content.

1. [The Web Accessibility Evaluation Tool \(WAVE\)](#) has a box for input of a web address; it produces a report of page features and accessibility problems.
2. [Fangs Screen Reader Emulator](#), which works only in Firefox as an Add-on, emulates how a screen reader would read a Web page.

From Barriers to Bridges

Allen and Seaman (2014) reported that in 2013, over seven million higher education students in the United States were taking at least one online course. Although statistics are not available on the percentage that has disabilities, the U.S. Census reported that 18.7% of the non-institutionalized population in 2010 had a disability (Brault, 2012). Clearly, online learning needs to address the needs of learners with disabilities.

Coombs (2012) commented “I believe that creating accessible online learning experiences for students with disabilities can do even more than give them a quality education—it can empower them to become stronger, more self-reliant people” (p. xiii). Designing for accessibility, and taking advantage of resources to make already-created content accessible, can move the use of information communication technologies from creating barriers to building bridges.

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References

- Allen, I. E., & Seaman, J. (2014 January). *Grade change: Tracking online education in the United States, 2013*. Babson Survey Research Group, Pearson and the Sloan Consortium. Retrieved from <http://sloanconsortium.org/publications/survey/grade-change-2013>
- American Council of the Blind. *The Audio Description Project*. Available at <http://www.acb.org/adp/ad.html#describer>
- Americans With Disabilities Act of 1990, Pub. L. No. 101-336, 104 Stat. 328. (1990). Retrieved from <http://www.ada.gov/pubs/adastatute08.htm#12208>
- Brault, M.W. (2012 July). *Americans with disabilities: 2010*. Retrieved from <http://www.census.gov/prod/2012pubs/p70-131.pdf>
- Coombs, N. (2010). *Making online teaching accessible: Inclusive course design for students with disabilities*. San Francisco: John Wiley & Sons.
- Daisy Consortium. Daisy Standard. Retrieved from <http://www.daisy.org/daisy-standard>
- Danielsen, C. (2011, October 11). National Federation of the Blind and Penn State resolve accessibility complaint. Retrieved from <https://nfb.org/node/958>
- Danielsen, C. (2012, March 6). Florida State University resolves litigation with students. Retrieved from <https://nfb.org/node/913>
- Dudley v. Miami University. (2014, January 10). Case No.: 1:14-cv-38 (Southern District of Ohio, Western Division).
- Federal Communications Commission. (2010). 21st Century Communications and Video Accessibility Act (CVAA). Retrieved from <http://www.fcc.gov/guides/21st-century-communications-and-video-accessibility-act-2010>
- Goldberg, L. & Rothberg, M. (2013, January 28). Born digital – And accessible [Webinar]. *Educause ELI webinars*. Retrieved from <http://www.educause.edu/library/resources/born-digital-and-accessible>
- International Digital Publishing Forum. (2014). EPUB 3. Retrieved from <http://idpf.org/epub/30>
- Mace, Ron. (2008). About UD. The Center for Universal Design, College of Design, NC State University. Retrieved from http://www.ncsu.edu/ncsu/design/cud/about_ud/about_ud.htm
- Maurer, Marc. (2013, July 4). Presidential report 2013. Address delivered at the National Convention of the National Federation of the Blind. Retrieved from <https://nfb.org/images/nfb/publications/convent/presreport2013.htm>
- Palfrey, J. G., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York: Basic Books.

- Parry, Mark. (2010, November 12). Penn State accused of discriminating against blind students. *The Chronicle of Higher Education*. Retrieved from <http://chronicle.com/blogs/wiredcampus/penn-state-accused-of-discriminating-against-blind-students/28154>
- United Nations. Convention on the rights of persons with disabilities. Retrieved from <http://www.un.org/disabilities/convention/conventionfull.shtml>
- U.S. Department of Education. (2006, August 14). Individuals with Disabilities Education Act of 1990, Part II. Retrieved from <http://idea.ed.gov/download/finalregulations.pdf>
- U.S. Department of Justice. (2013, July 23). Justice department settles with Louisiana Tech University over inaccessible course materials. Retrieved from <http://www.justice.gov/opa/pr/2013/July/13-crt-831.html>
- U.S. Department of Justice. Section 504, Rehabilitation Act of 1973. Retrieved from <http://www.dol.gov/oasam/regs/statutes/sec504.htm>
- U.S. Department of Justice. Section 508 of the Rehabilitation Act (29 U.S.C. § 794d). Retrieved from <http://www.justice.gov/crt/508/508law.php>
- Varonis, E., Johanyak, M., & Jevack, J. (2013, October). *Reborn digital but not born accessible: challenges of digital accessibility*. Paper presented at Quality Matters 5th Annual Conference, Nashville, Tennessee.
- World Wide Web Consortium. (2005). Introduction to web accessibility. Retrieved from <http://www.w3.org/WAI/intro/accessibility.php>
- World Wide Web Consortium. (2008). Web content accessibility guidelines (WCAG) 2.0. Retrieved from www.w3.org/TR/WCAG20/

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