Accessibility and Libraries in the Internet Era: Space, E- Resources, and the Web

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Abstract:

Libraries in all nations of the world have users who suffer from visual, hearing, speech, and cognitive impairments and many libraries already accommodate the needs of users who suffer from accessibility challenges. Spatial accessibility is the first basic accommodation that libraries can facilitate. A second kind of accommodation need is found in access to e-resources. The dramatically increasing volume of e-resources in the Internet era creates an enormous barrier for users with impairments. The third kind of accommodation need relates to web content and how libraries must ensure that all web content complies with the Web Content Accessibility Guidelines (WCAG) 2.0. This paper demonstrates how the University of Ottawa's Brian Dickson Law Library has been addressing these accessibility challenges and providing accommodations for space, e-collections, and the Web for their users with impairments.

Keywords: accessibility, libraries

Authors' Note:

We use the term "impairments" throughout this paper (not "disabilities") because we feel the word "impairments" gives more respect to people who may have difficulty using a library.

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1. Introduction

By law, libraries in the public or private sector in Ontario, Canada have to provide accommodations to its users and employees who are living with impairments as mentioned in the Accessibility for Ontarians with Disabilities Act (Figure 1). In fact, libraries in all nations of the world have users who have visual, hearing, speech, and cognitive impairments and many libraries already accommodate the needs of users who suffer from accessibility challenges. This paper outlines recent scholarly literature on the accessibility of libraries in the current Internet era focusing on space, e- collections, and the Web. Each of those three elements will be explained as to how they are linked to accessibility principles and library services. Some real life case studies from the University of Ottawa's Brian Dickson Law Library (BDLL) will be discussed and lessons learned will be shared.

The Accessibility for Ontarians with Disabilities Act, 2009, SO 2005, c 11, paragraph two defines "disability" using the following five categories:

(a) any degree of physical disability, infirmity, malformation or disfigurement that is caused by bodily injury, birth defect or illness and, without limiting the generality of the foregoing, includes diabetes mellitus, epilepsy, a brain injury, any degree of paralysis, amputation, lack of physical co-ordination, blindness or visual impediment, deafness or hearing impediment, muteness or speech impediment, or physical reliance on a guide dog or other animal or on a wheelchair or other remedial appliance or device,
(b) a condition of mental impairment or a developmental disability,
(c) a learning disability, or a dysfunction in one or more of the processes involved in understanding or using symbols or spoken language,
(d) a mental disorder, or
(e) an injury or disability for which benefits were claimed or received under the insurance plan established under the Workplace Safety and Insurance Act, 1997; ("handicap")

Figure 1: The definitions of "disability" in the Accessibility for Ontarians with Disabilities Act, 2009, SO 2005, c 11

2. Literature Review

Accessibility and Library Space

Spatial accessibility is the first basic accommodation that libraries can facilitate. The accessibility to library space issues are still continuously being discussed in the academic communities and professional librarianship. A recent study by Small, Myhill, & Herring-Harrington (2015) insists that all libraries should work endlessly to improve design and modification of the library physical space to accommodate users with impairments. In some cases, libraries need to make only small changes that require no cost. For example, libraries can rearrange furniture for users in wheelchairs to comfortably move around or can make their signage and posters with larger font size so that users with visual impairments to see the texts clearly. These changes create a welcoming atmosphere and make users with impairments feel included in the libraries.

Furthermore, a study by Bodaghi & Zainab (2013) talks about the spatial accessibility evaluation of fourteen public and university libraries in Iran using the accessibility checklists from the American Disability Act and the International Federation of Library Associations and Institutions (IFLA). Researchers found that more than half of the selected libraries did not have ramps and exclusive space for users with impairments. This accessibility assessment is a good example for other libraries worldwide to verify their own accessibility conditions. The accessibility assessment report can be used as a key document to request extra funding from internal and external sources to improve the access to libraries.

Another interesting recent paper (Timony, 2015) discusses the accessibility in the present-day makerspace movement within libraries, especially at public and university libraries. Makerspaces open access for ordinary people to technology equipment to create something. Some creations can actually lead to some innovative discoveries. These makerspaces share the same principle with libraries in term of creating opportunities for all people to access the materials (knowledge or tools). They help to reduce gaps and barriers especially among impoverished populations. As noted, it is important that all makerspaces should provide assistive technologies that can help the peoples with impairments to create their projects. However, some current technologies used in the makerspaces are not fully developed with accessibility functionalities. 3D printers, for example, are still exclusively operated and processed through visual interactions and commands. People with visual impairments are facing difficulties when they use these 3D printers.

Accessibility and Library E-Resources

Library e-resources also require accessibility accommodation. A recent research paper by Jaeger, Wentz, & Bertot (2015) positions accessibility and library resources within a human rights legal framework. They state that libraries are obligated to help users with impairments to have equal and barrier-free access to all types of library resources. This includes both print and e-resources, as library materials are being offered more frequently in digital format. Verifying the accessibility of e-resources has become increasingly necessary and is linked to libraries' social justice responsibility. Rodriguez (2015) and Schmetzke, Pruitt, & Bruno (2015) raise awareness of the

importance of evaluating accessibility in the e-resources selection. Libraries must carefully consider how the e-resources they are going to acquire will meet the needs of people with impairments. Librarians are urged to ask vendors about their e-resource products' accessibility before agreeing to purchase or subscribe.

Accessibility and Library Web

A third type of accessibility accommodation need relates to web content and how libraries must ensure that all web content complies with the Web Content Accessibility Guidelines (WCAG) 2.0 of the World Wide Web Consortium (W3C). A study by Menzi-Çetin, Alemdağ, Tüzün, & Yıldız (2015) evaluated university websites, including the library webpages, for accessibility and usability for the visually impaired students who participated in their research. One of their research findings suggests that university websites should make text versions of all pages available for students with visual impairments in order that they can use available assistive technologies to help them understand the content on the webpages. Another similar research paper (Comeaux & Schmetzke, 2013) evaluates the web accessibility on fifty-six academic library websites in North America by using the Bobby 3.1.1. It is a web-based application that evaluates websites for their accessibility. They found that the library websites layouts that were built with the cascading style sheets (CSS) have less web accessibility errors than those constructed with tables to control their web layouts (Comeaux & Schmetzke, 2013). Another study (Charbonneau, 2014) raises the question of establishing web accessibility guidelines for public library websites, particularly for seniors. Seniors are the main user group of most public libraries. Therefore, the public library websites should really be friendly to seniors' visual conditions. Generally, they need web content to be presented in a larger front size or with an option to enhance texts and images. Research by Maatta Smith (2014) concludes that the web accessibility in public libraries still requires more system improvement and maintenance to meet the accessibility needs of users.

3. Accessibility and Space

Library space and the accessibility improvements have long been discussed in the history of libraries. Libraries want to accommodate all the needs of their users. Libraries carefully consider where to put collections and services in the area that will create the barrier free environments for users with impairments. Unfortunately, many libraries are now facing limited budgets for such purposes due to the global economy uncertainty. There have been a pause with space upgrade in many libraries. Free or low cost alternative solutions are required to improve the library spaces and make them more accessible.

Lessons Learned from the BDLL

There are some existing accessibility accommodations in Fauteux Hall at the BDLL which include the indoor vertical lift which permits users with impairments to access to the elevators, automatic door buttons, low-height study tables, low-height drinking water fountain, etc. (Figure 2). However, the BDLL still has some space to improve with its accessibility such as the main circulation counter. It is too high for users in wheelchairs. The circulation counter was made some time ago before the accessibility law came into effect in Ontario. The BDLL has requested special funds to improve the counter, but such monies are not available given the University of Ottawa's financial situation. The BDLL must be creative in adapting. Recently the BDLL introduced standing workstations using tables from the copying room. The standing workstation is well used as some library users are aware of health impacts of sitting for long periods of time.

Automatic door button

Indoor vertical lift

Low-height drinking water fountain

Figure 2: Some accessbility accommodations in the BDLL space.

4. Accessibility and E-Resources

Libraries provide shared public computers for users to access to e-resources to which libraries subscribe. Users can search for the materials in the library online website and catalogue. However, in academic universities like the BDLL, many users prefer to use their own personal laptops that they bring with them to the libraries. For users with impairments, they also prefer to use their own devices because they want to be sure that they have the assistive technologies such as the text to speech software, speech recognition software, and bibliographical organizational applications that enable them to better access the library's e-resources.

However, some electronic books do not integrate well with their assistive technologies and adaptive technologies, due to restrictions required in the licenses that the library holds with the publishers of the content. It becomes a serious issue for some users with impairments as they cannot be as productive as they would like to be. It will take them a long time to read and integrate the e-books with their assistive software separately. It would be better if the e-resources and the

accessibility software were always compatible. However, as shown by this example below, this is not the case in the real world.

Lessons Learned from the BDLL

At the University of Ottawa, there is a librarian responsible for library accessibility and the University Access Service Office helps students with impairments to succeed in their learning endeavors. Students with impairments register with the Access Service Office in order to receive the extra academic services available at the University.

At the BDLL, we noticed that some e-books did not integrate well with the assistive technology and adaptive technology that users with impartments were using. Most law students with impairments were using Kurzweil 3000 software to help with their learning. They reported using this software to read textbooks, write research papers and complete class assignments. The Kurzweil 3000 software allows its users to manage their personal digital content, to highlight text, to insert notes, to listen to e-books via text-to-speech, and to magnify text. However, some law students with impairments found that some publishers' e-book platforms do not allow them to use all the necessary Kurtzweil 3000 accessibility functionalities. They had to rely the publishers' e-book platforms to read the texts. This is a problem of interoperability between systems and causes difficulties for students with impairments who are already required to spend more time to absorb information, compared to users with minor or no impairments. The BDLL has responded to this problem by making a special request to acquire or transcribe the e-books into new alternative formats that can be integrated with the Kurtzweil 3000 software.

5. Accessibility and the Web

In Canada, there are laws requiring all publicly funded organizations to be fully accessible for people with impairments. The accessibility laws are at both the federal and province levels, including, those found in the province of Ontario which is the jurisdiction of the BDLL. The accessibility laws cover not only physical space, but extend to the web environment as well. Library websites and online documents have to be in accessible formats. The Web Content Accessibility Guidelines (WCAG 2.0), a part of the World Wide Web Consortium, is the most established international guideline and standard for web accessibility developments. The WCAG 2.0 has been collaboratively developing by many web development experts worldwide. In term of web technical elements, all types of websites, including the library websites, share common web accessibility issues.

Firstly, missing heading styles creates difficulty for screen readers to read aloud words for people with visual impairments. The heading styles also help the screen readers to know the content structure. These styles help peoples who use the screen readers to more easily navigate the online content on the web.

Secondly, the alternative text tags on images are often omitted, resulting in no information for screen readers to explain the description of the images on the web to users with visual impairments.

Users will then miss crucial information because many web designers prefer to use images to represent the content ideas and images on the web are helpful to make the web more interesting and appealing. Images on the web are a barrier for people with visual impairments.

The next issue is insufficient colour contrast between text and background. This creates difficulty in terms of the ability to read the texts especially for people with colour blindness, if the background and font color are too similar or if there is not enough contrast. Texts cannot be read easily.

Another issue is with the PDF documents on the web. In some cases the inaccessible PDF was put up on the web. Screen reader software will see the inaccessible PDF as images only. The texts cannot be read out aloud. There are many ways to create accessible PDF. One of the method can be done by scanning a print document with the Optical Character Recognition (OCR). Most Xerox photocopy machines have this capability. Adobe Acrobat can then be used to verify the document tag elements.

The last common accessibility error is found on the web videos without content captions. Captions in videos help people with audio impairments to understand the content while they are watching the videos on the Internet. YouTube has an option to allow video creators to manually insert their own captions as well as the automatic caption creation option done by machines.

Lessons Learned from the BDLL

- *The Web Accessibility Upgrade Project on the Principles of Legal Research*

"*The Principles of Legal Research"* is the BDLL's online guide on legal research. It is a bilingual (English and French) online learning tool for all first year students in both common law and civil law. The Faculty of Law at the University of Ottawa is divided into two sections of common law and civil law. Law librarians developed these online modules to facilitate teaching components such as readings, student assignments and assessments. *The Principles of Legal Research* website was first developed in the summer of 2009 as a joint project between the librarians at the BDLL and the Faculty of English Common Law at the University of Ottawa. For a number of years, librarians at the BDLL have been actively involved in the development and delivery of legal research courses mandatory for all students in their first year of law school.

Recently, law librarians have undertaken to upgrade web accessibility on *The Principles of Legal Research*. In the first phase, the BDLL focused on adding content captions into the video tutorials (Figure 3). This was an upgrade to the content for the visually and hearing impaired audiences. The BDLL then worked on checking the web layout to ensure it met accessibility guidelines, is bilingual-friendly, optimizes usability in general and across all devices including mobile. During the project, the BDLL also made some interesting findings such as that the online internal and external links should be verified regularly. The BDLL discovered that this type of project requires a lot of time because there are so many small details to attend to. However, accessible websites

are generally easier to update and modify. This proved to be a very fulfilling project as the BDLL succeed in reducing barriers to access information for people with impairments.

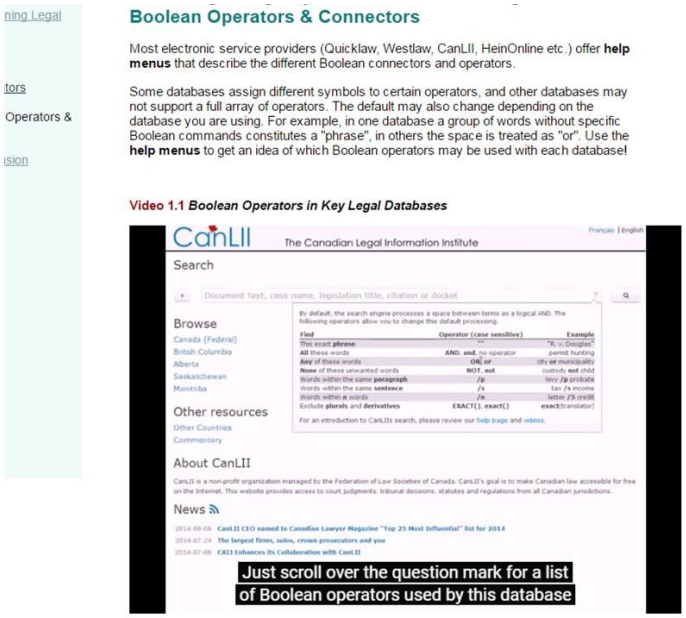

Figure 3: Video captions were added on the Principles of Legal Research.

- *The Past Exams Digitization Project for Online Access*

Many law professors at the University of Ottawa has asked the BDLL to keep some of their past exams for the currently enrolled students in their courses to see the sample exam questions in the previous academic terms. Some professor's past exams contain examples of answers. It helps students to see the scope and direction of the answers that the professors are expecting from students. Due to the nature of traditional law courses in Canada, many law courses evaluate students with one hundred percent on their final open-book written exams. It means there are no mid-term exams, small assignments, and attendance checks during the academic term. Therefore, these conditions create the high value and demand for the professors' past exams among law students. At the BDLL, the past exams were kept in the reserve collection, where the items can only be borrowed for a short-term period up to four hours. Students have to return the items within the given timeframe because the exams are in high demand. The BDLL noticed the students were under a lot of stress to obtain copies of past exams.

The BDLL saw the potential of a past exam digitization project. The project would allow students to access the past exams online. Many users could use the same documents at the same time. Another benefit of this digitization project is to free up space at the circulation staff's working area where all the print reserve collections also have been kept along with the staff's working stations. This digitization project helps the BDLL to evaluate which of the past exams should continue to be kept.

In the first stage of this project, the BDLL contacted the law professors who are the creators of those past exams to ask their permission to digitize their exams and make them available online through the BDLL website. This way, the BDLL is clearing the copyright and provides the opt-out option to the professors who do not want their documents to be available to everyone online. After the BDLL receives the professor's permission, it is time to begin to digitize the past exams. The goal is to have all past exams in the accessible PDF format. Generally, the accessible PDF can be created using the following two techniques. If the documents were sent by the professors already in the PDF, the BDLL have to verify it is already accessible by checking the search ability of the document with the keyboard and the readability by the text-to-speech software which the BDLL will test with the JAWS screen reader, and also to check the overall color of the document to make sure the document is not too dark or too light. If it is too dark of light this can create problems for the users with visual impair. We do not check the zoom in and out ability because the Adobe PDF reader already has the text zoom functionality on their applications.

In the case when the PDF provided by the professors is not accessible, it means that the past exams were scanned or produced as an image format. The BDLL solves such problems by converting the PDF to a Word format. There are many open source PDF to Word converter applications on the Internet. MS Word allows the accessibility setting before saving it as a new document in PDF again. The basic rule of creating accessible PDF is to make sure all metadata tags in the documents are put in properly because those tags will be used by the screen reader applications. Tags identify the content headings, unordered and ordered lists, hyperlinks, alternative texts to explain images, etc. This PDF to Word converting technique works well for this project because each professor's exam is relatively short, few words and pages.

After accessible PDF of those past exams are created, the files are loaded onto the Library's main server. The system team will send the BDLL the online location links of each document. Then, the BDLL will insert the links on the past exams page that has been created especially for this digitization project on the BDLL website (Figure 4). After the BDLL officially launches the web page to the public, we will search for any technical issues that may arise.

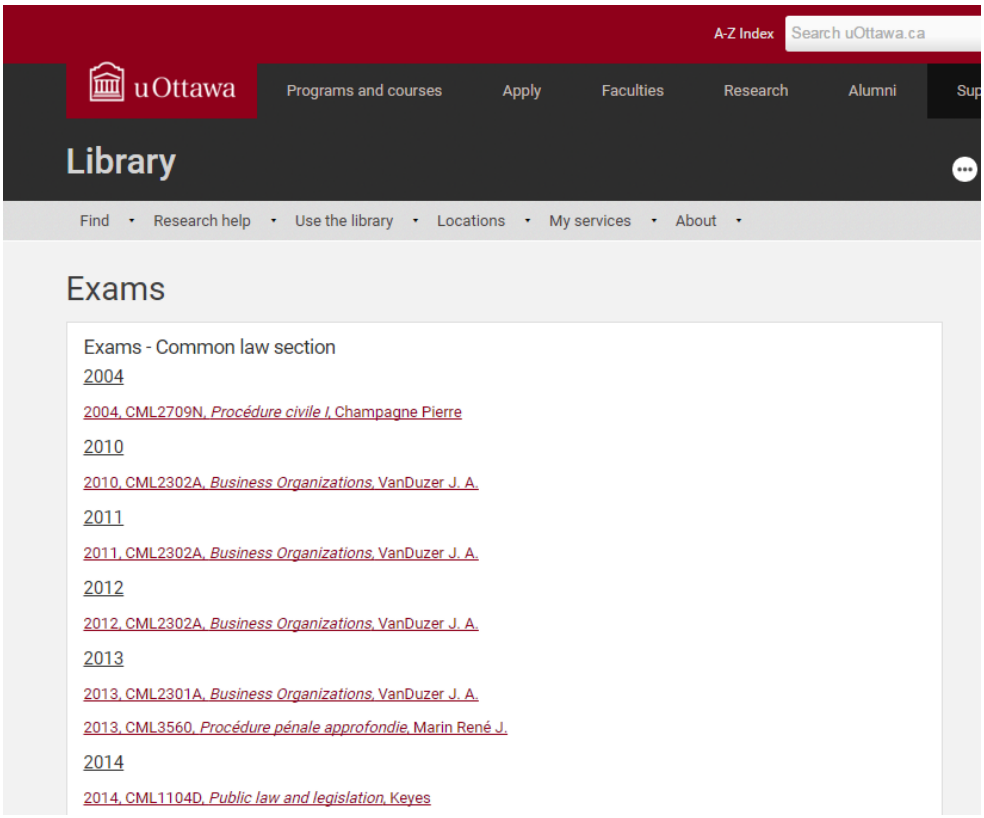

Figure 4: Past Exams Webpage

6. Conclusion

The accessibility projects in libraries associate with the freedom of information principle and human rights. Such projects aim to reduce gaps and barriers for all people to have equal access to information offered through the libraries. More importantly, people with impairments are included. This paper outlines the accessibility principles applied to the library space, e-resources and the Web. We discovered that the accessibility on the e-resources and the Web is well developed due to the advancing assistive technologies in the recent decade, especially the text to speech software and the optical character recognition (OCR). It opens so many possibilities and freedom to people with impairments. Libraries should take this opportunity to bring the new technologies into its services and operations to better serve all users.

7. Limitations and Future Research

This paper only discusses Ontario accessibility laws. Each province in Canada and all other countries have their own accessibility laws. Another limitation is the BDLL has not yet conducted any accessibility testing with the actual users with impairments related to the projects discussed in this paper.

References

Accessibility for Ontarians with Disabilities Act. (2009). Retrieved from http://www.canlii.org/en/on/laws/stat/so-2005-c-11/latest/so-2005-c-11.html?autocompleteStr=Accessibility&autocompletePos=2

Bodaghi, N. B., & Zainab, A. N. (2013). Accessibility and facilities for the disabled in public and university library buildings in Iran. *Information Development*, 29(3), 241-250. doi:10.1177/0266666912461265

Charbonneau, D. H. (2014). Public library websites and adherence to senior-friendly guidelines. *Public Library Quarterly*, 33(2), 121-130.

Comeaux, D., & Schmetzke, A. (2013). Accessibility of academic library web sites in North America: Current status and trends (2002-2012). *Library Hi Tech*, 31(1), 8-33.

Jaeger, P. T., Wentz, B., & Bertot, J. C. (2015). Libraries and the future of equal access for people with disabilities: Legal frameworks, human rights, and social justice. *Advances in Librarianship*, 40, 237-253. doi:10.1108/S0065-283020150000040020

Maatta Smith, S. L. (2014). Web accessibility assessment of urban public library websites. *Public Library Quarterly*, 33(3), 187-204.

Menzi-Çetin, N., Alemdağ, E., Tüzün, H., & Yıldız, M. (2015). Evaluation of a university website's usability for visually impaired students. *Universal Access in the Information Society*, 1-10.

Rodriguez, M. (2015). Evaluating e-resources for accessibility: A conference report on the Association of College and Research Libraries (ACRL). *Journal of Electronic Resources Librarianship*, 27(3), 210-211.

Schmetzke, A., Pruitt, C., & Bruno, M. (2014). *Collection development, e-resources, and meeting the needs of people with disabilities*. Paper presented at the Charleston Library Conference on the Importance of Being Earnest. doi:10.5703/1288284315579

Small, R. V., Myhill, W. N., & Herring-Harrington, L. (2015). Developing accessible libraries and inclusive librarians in the 21st Century: Examples from practice. In *Accessibility for Persons with Disabilities and the Inclusive Future of Libraries* (pp. 73-88). Emerald Group Publishing Limited.

Timony, P. (2015). Accessibility and the maker movement: A case study of the adaptive technology program at District of Columbia public library. *Advances in Librarianship*, 40, 51-58. doi:10.1108/S0065-283020150000040011