Assistive Technologies: Screen Readers

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Introduction

The increased use of the Internet and the efficiency of converting print material to PDF, has led to the need to focus on assistive technology and how truly accessible the content is for disabled users. According to Kearns, Frey, and McMorland (2013), there are over 6.1 million online learners in higher education. The authors also noted that 10.8% of 4-year institution learners have some type of disability, leading them to reasonably assume that there exist many online learners with a disability. Online courses open new opportunities for learning; however, the ability to navigate and discover information is still unfamiliar for many and more difficult for those using assistive technologies. A large number of those using assistive technology have some form of visual impairment. According to Lazar, Allen, Kleinman, and Malarkey (2007), screen readers are the most popular assistive technology for users with visual impairments. In this paper, I will discuss the use of screen readers and whether digital content is accessible for users of the technology.

Background

I chose to research screen readers after reading information concerning accessibility for those who are sight-impaired at the Accessible Course Materials website while completing an accessibility course offered by Coastal Carolina University's Office of Online Learning (COOL). The site introduced a variety of assistive technologies such as screen readers, screen magnifiers, text readers, and speech dictation. Also, I have a close friend who has 20% sight in only one eye, so I have experience using his PC and listening while he uses this type of technology to read websites, documents, and messages on his cell phone. He also works full-time as a sales associate and travels extensively alone. This brings to focus the issues of accessibility as it pertains to websites and to tools available in work settings, in addition to online courses.

Screen readers use synthetic speech (using the computer's speakers) to inform the user what is on the monitor (computer or other type) and to confirm when a particular key is pressed when writing. They are software packages that are sometimes built into operating systems (Lazar et. al). The first screen reader was created by Jim Thatcher at IBM in 1986 for low vision staff members using DOS operating system. Currently, two of the most popular brands of screen readers are JAWS and Window-Eyes. When considering web-based courses, accessibility should be an inclusive design concept that allows learners with disabilities to understand, navigate, interact, and contribute to the course. Following a universal design will positively impact the need for the accommodations or modifications for those with disabilities, especially in a digital environment (such as an online course). Screen readers require content to be consistent and simple in order to benefit the user.

The Rehabilitation Act of 1973 prevented discrimination against individuals with disabilities in federally assisted programs. Section 508 of that law was added to address accessible use of information technology by disabled individuals. The group responsible for web content standards, the World Wide Web Consortium (W3C), oversees the Web Accessibility Initiative (WAI) to set standards and guidelines for designing accessible websites. Literature used in this paper considers accessibility issues for screen readers that can be fixed by those developing content, screen reader software issues, and behavior modifications when using screen reader software.

Results

The primary issues for learners using assistive technologies such as screen readers were basically the same throughout my research. In Kearns et.al (2013), a skilled screen reader assessed the ability to navigate and understand content in an online course. The purpose was to

determine what issues exist and suggest solutions to address those problems. The author suggested designing content that follows the principles of clarity, consistency, and organization. Also, the use of meta-data (such as alternative text on images) to make web pages and course documents more readable by the screen readers, especially for tables and complex data presentations.

Some of the major issues included poorly labeled hyperlinks, lack of alternative text for images, confusing page layouts, technical incompatibilities between the screen reader and a web-based plug-in, poorly designed forms, inaccessible PDF files, and screen reader crashes. Many online courses use some form of content management for their information. In Calvo, Iglesias, and Moreno (2014), the authors reviewed the Moodle learning content management system (LCMS) for accessibility barriers. The LCMS or LMS is used to create content and manage e-learning environments. In addition to the issues mentioned previously, the authors also discovered additional barriers for learners needing assistive technology, specifically screen readers. These issues included the inability to submit or publish information without assistance, duplicate or similar link naming, and the use of colors or other non-linguistic elements to convey information. The authors also cited the need for those developing content to have prior programming skills to use the LMS and the disadvantage of obtaining and/or maintaining a job for learners.

Though many of these issues will cause angst for the users of screen readers, and should be addressed by the developers of the content, some issues (such as screen reader crashes) are the responsibility of the developers of the screen reader. The combination of these issues can cause frustration for the user. Lazar et al (2007) states that frustrated screen reader uses say they waste as much as 30.4 percent of their time spent on the computer due to these problems. Also

mentioned are conditions that are byproducts of these frustrations such as job performance and increased blood pressure.

Another area that provides great opportunity for sharing and accessing digital content is converting print material to PDF (portable document format). The documents created are ready-made for many screen readers without further modifications. Browder (2018) states that creator of Adobe Acrobat released the file specification for his PDF format to the International Organization for Standardization (ISO) for management and expansion and in doing so, released it to the open source community, solidifying its use in public entities such as the government and educational units. The flexibility of the PDF format makes its use by screen readers functional; however, complex matter such as tables and equations is still best rendered in hypertext markup language (HTML) due to the simplicity it provides. Libraries are adding PDF to their special collections and other resources. The aids (tools) for finding information studied in Southwell and Slater (2013) contained some of the same issues as websites and Moodle course content. The authors noted that although libraries work to make electronic materials, resources, and services accessible to all, they still encounter issues with navigation and inaccessible PDF documents (as well as other externally linked documents). As libraries become more available online, those maintaining content are more aware of the inability of those needing assistive technology to access certain content. Finding solutions to these issue is now a top priority for many libraries.

Choosing the best screen reader software can sometime lessen some of the issues seen when reading data or incompatibility between software packages. McCarthy, Pal, and Cutrell (2013), discuss behavior among visually impaired learners when choosing screen reader software packages. The authors state that less experienced users tend to choose software based on voice

quality, leaning toward costlier proprietary software, while experience users are more interested in application support and tend to use open software packages.

Conclusion

In conclusion, educational entities and course developers have a responsibility, legally and ethically, to provide learners courses that are accessible. Even so, many online courses, web sites, and library materials, still have navigation barriers that can render sections of a course inaccessible and documents unreadable. Although organization, such as the WAI, have formed to address and provide policies for these concerns, it is up to the educational organizations to create content that follows the guidelines.

The support of screen readers is important because it allows individuals to access needed information whether they are going back to school to earn a higher education degree, going into the workforce, or just seeking entertainment or other resources. This access to information is a necessary part of everyday life for those who are visually impaired. As several of the authors suggested, developing content by following the standards set by the W3C will improve screen reader function, removing barriers to education and work for many. Screen reader developers should also address software issues when they arise.

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