The Inaccessibility of Accessible Web Design: Bringing Web Content Accessibility Guidelines to Mainstream Audiences

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Abstract

Web Content Accessibility Guidelines (WCAG) have been around since 1999, yet, as of 2018, less than 10% of websites meet accessibility compliance. The researcher hypothesizes this is because accessibility guidelines are a technical standard for web developers, industry content creators, and accessibility evaluation tool developers but this group of people only makes up a small portion of web content creators. With the use of content management systems (CMS), anyone with an internet connection and email address can create a website. Though some CMS platforms are beginning to integrate accessible design practices, the most common ones do not require content to be accessible to publish websites for public access. Some of these platforms have hard-to-find or missing accessibility features and do not provide descriptions or explanations of accessible design practices for anyone without prior knowledge to follow.

This study addresses the knowledge gap in understanding why websites continue to be built inaccessibly by co-designing with the previously overlooked stakeholder group of self-taught web content creators who use CMS platforms. The main goal of this study is to develop a prototype designed to assist these web content creators in understanding and implementing accessibility guidelines without needing prior accessible design knowledge. The widespread implementation of this product would give mainstream audiences the power to create accessible content. This project aims to shift the onus of making content accessible to the content creators rather than the people affected by inaccessible content and inspire change toward a more accessible digital world.

Land Acknowledgement

Though this study was conducted in a virtual format, I would like to gratefully acknowledge that I live and work on the traditional territory of the Mississaugas of Scugog Island First Nation, territory covered by the Williams Treaties. OCAD University is located on the ancestral and the traditional territories of Mississaugas of the Credit, the Haudenosaunee, the Anishinaabe and the Huron-Wendat, the original owners and custodians of the land. I would also like to acknowledge the lands on which the digital platforms used in this project reside. Microsoft Canada's head office is also located on the traditional territories of Mississaugas of the Credit, the Haudenosaunee, the Anishinaabe and the Huron-Wendat. Zoom headquarters are located in San Jose, California, on Muwekma Ohlone Territory.

I acknowledge these lands out of respect for the Indigenous nations who have cared for Turtle Island, also called North America, from before the arrival of settlers until this day. I give thanks for the opportunity to live, work, play, and share knowledge from these lands. If you are interested in learning about what traditional territories you reside on, consider checking out native-land.ca.

Accessibility Statement

The goal of this project was not only to help teach people about accessibility guidelines but also to be accessible itself. I have done everything possible to ensure that the materials used throughout this project were accessible to all participants or had alternative formats readily available to anyone who required them. All final products of this project, including this report, have been made to be accessible or have an accessible counterpart. The language used in this report has been written in plain language whenever possible. Where this was not an option, descriptions of the terms are available in the text: each highlighted word or phrase links to an interactive glossary available at the end of the document.

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Introduction

Problem Statement

As of 2020, over 1 billion websites have been created using Content Management Systems (Schäferhoff, 2020), which is over half of all active websites (Radoslav, 2020). However, in 2018, statistics showed that less than 10% of websites meet accessibility standards (Christopherson, 2018). CMS platforms do not teach users how to create accessible content and do not ensure websites are compliant (Steenhout, 2017). The alternative accessibility overlay tools are ineffective and only provide a quick-fix solution (Bryne-Haber, 2020). These products do not address the main problem: people continue to build inaccessible websites even with web content accessibility guidelines (WCAG). Until we address why people are not building accessible websites, people with disabilities continue to have the onus of creating accessible workarounds on them.

Study Questions

There are two questions that this study aims to answer. The first question is: are people who use CMS platforms to develop websites not creating accessible content, and if so, why? Should the research prove that people are not creating accessible websites due to a lack of knowledge or understanding of web accessibility guidelines, the study will continue to the second question. How might the researcher and participants co-design a prototype that ensures websites built using CMS platforms are compliant with WCAG 2.1 guidelines, explain accessibility guidelines in terms that are easy to understand and apply by anyone, and has a simple and easy to use interface?

Research Objective

This research aims to uncover the demographics of CMS platform users, find the root of why websites remain inaccessible, and how effective current products on the market are at addressing this problem. This study aims to work with the primary stakeholder group to develop a product that will help them learn about and implement accessibility guidelines into their web content. The goal is to address inaccessible web content at its source and add to a more inclusive digital world for people with disabilities.

Hypotheses

The researcher worked with three hypotheses during this study. The first was that most CMS platforms have missing or hard-to-use accessibility features without previous knowledge of them, and they do not make accessibility compliance mandatory to publish the website. The second hypothesis was that these self-taught content creators either do not know about or have a hard time understanding the web accessibility guidelines and how to use them because they are not written in plain language and require specific background knowledge. These guidelines can look overwhelming with the amount of jargon, acronyms and content length that a person may choose not to learn about them further. The researcher tested these two hypotheses during the survey phase. Participants were asked about their knowledge of accessibility guidelines and their experience with accessibility tools in the CMS platforms they have been using. The third hypothesis was that if these guidelines were broken down and written in plain language specifically for this stakeholder group and integrated into their content creation process, they would be able to implement these guidelines in all work going forward. This hypothesis was tested during the prototyping phases by seeing if the prototype helps the participants better understand and apply the web accessibility guidelines and if they can retain, use, and share this information weeks later.

Literature Review

Seven databases were searched for this literature review – DH Hoover Library, Google Scholar, W3C, Medium, Whitby Public Library, eSSENTIAL ACCESSIBILITY and Google. The goal was to find diverse perspectives on web accessibility and its implementation through scholarly and peer-reviewed articles, industry perspectives, community and advocacy groups for people with disabilities, and government laws and guidelines on web accessibility. This research included research study results, blogs and videos about first-hand experiences of people with disabilities, government accessibility guidelines and explanation videos.

The keywords and phrases used in the search terms focused on: web accessibility, web accessibility guidelines, including the WCAG and the Accessibility for Ontarians with Disabilities Act (AODA) and who uses/knows about them, the questions

of why websites continue to be built inaccessibly and who creates inaccessible websites, understanding what CMS platforms are working to make accessible websites, and how people with disabilities feel about web accessibility.

The author conducted this research to gain insight into how to bring accessibility guidelines to a larger population of people regardless of their previous knowledge of accessible design. The researcher also investigated whether any products are currently available to the public with similar goals and their effectiveness. These findings have structured the following proposed co-design study with the identified primary stakeholder group.

Peer-reviewed

The peer-reviewed articles focused on addressing why accessibility in web design is essential and how to co-design with people with disabilities to develop digital products that are more accessible. When working with people with disabilities, most research studies focused on a particular disabled group rather than a more diverse approach. The researcher was unable to find information regarding a study around why people do not create accessible websites or studies that work with groups outside of people with disabilities as this study aims to do.

One of the more influential articles was Brizee, Sousa, and Driscoll's study on co-designing the Purdue Online Writing Lab (Purdue OWL) with disabled participants over several years to make the website more accessible (Brizee, Sousa, & Driscoll, 2012). Though working with a different stakeholder group, the co-design format using extensive survey results and individual user testing with a small sample became a framework for the structure of this co-design study. Another vital article was Schmitz, Sonderegger, and Sauer's analysis of if implementing web accessibility guidelines is beneficial to both people with visual impairments and people who are not visually impaired (Schmitz, Sonderegger, & Sauer, 2017). The study found that accessible websites created a better overall experience for all audiences interacting with them. These findings confirmed that designing for accessibility benefits more than just people with disabilities. This information can help explain the importance of implementing these guidelines to the participants of this study.

Government

The government articles that appeared from the search focused on web accessibility guidelines and policies (W3C Web Accessibility Initiative (WAI), 2020), teaching how to implement accessibility guidelines (W3C Web Accessibility Initiative (WAI), 2005), and why accessible design is important (W3C Web Accessibility Initiative (WAI), 2017). W3C was a primary resource for this information as they have resources for all aspects of web accessibility. The guidelines and information provided by the W3C specifically are primarily for web designers and programmers using industry jargon that is not accessible to people from other backgrounds. There was little information regarding simplifying the accessibility guidelines or guidelines specifically for people who are not web designers but create web content. The researcher also consulted the AODA guidelines as they are similar to WCAG, and she is familiar with them through her work as a user experience designer in Ontario.

Disabled Community & Organizations

The community and organization information came from personal blogs, videos and database resources from organizations focused on disability advocacy. These personal blogs focus on how individuals navigate accessible and inaccessible web content based on their personal experiences. The researcher consulted blogs by disabled designers and designers with personal connections to people who have disabilities that advocated for the use of accessible web design and explained guidelines in accessible, plain language with visual guides (Sartori, 2017). The disability advocacy organizations reinforced the need for accessible web design and provided resources for implementing them, including accessibility checkers for websites.

Trade

Trade articles came from the design industry. Most of the information came from Medium blogs, design books, and industry articles on other web platforms. Information regarding accessible web design focused on why accessible design is important and how to implement key guidelines. They explained why it is necessary to build accessible websites from the start rather than use ineffective quick-fix solutions at the end and what current tools on the market are doing to become more accessible. The most important findings from this research were that: over half of the world's websites use

CMS platforms (Radoslav, 2020), simplified accessibility guidelines exist but are for web designers and still use jargon, overlay tools do not solve inaccessible web design (Groves, 2019), and that some website creators like WordPress are working toward enforcing websites on their platform to be accessible but this may still take years to reach (Johnson, 2020).

Findings

Web accessibility guidelines have been around since the 1990s and officially started with the first iteration of the Web Content Accessibility Guidelines (WCAG 1.0), published May 5, 1999 (Sims, 2017). However, Dr. Cynthia Waddell's web design accessibility standard predated the WCAG publishing the design standards in 1995 (Hoffmann, 2019). Tim Burners-Lee had accessibility at the forefront while building the web with notes on accessibility starting from 1994 (Hoffmann, 2017). In the decades following, research on who needs accessible web content and why it is essential has been collected, and accessibility guidelines have been updated as technology advances (2017). However, 20 years after the Web Content Accessibility Guidelines (WCAG) were established, less than 10% of websites meet the WCAG 2.0 criteria (Christopherson, 2018). Though in recent years, governments across the world in countries such as Australia, Canada, China, Finland, Germany, Hong Kong, India, Italy, Netherlands, New Zealand, and the United States of America have begun adopting accessibility guidelines as recommendations, mandatory policy, or the law (W3C Web Accessibility Initiative, 2018). There is still a long way to go to address this global problem. COVID-19 and the ensuing lockdowns have made this problem even more prevalent, with the world turning to digital content and platforms for everyday life (Alexiou, 2020). Smart technology and virtual assistants also increasingly rely on accessibility features like audio searching, skipping to content using the site structure, and speech-to-text capabilities for everyday use by the general public (Scott, 2020).

Overlay tools are accessibility third-party interfaces embedded into a website's code. An overlay interface will appear on the website with options to update colour contrast, change text size, use text-to-speech, and other accessibility options for each user. Though, on the surface, these tools seem incredibly powerful and an easy way for everyone to create accessible websites, they have been proven to have very superficial

effects and do not work as well as they claim to (Byrne-Haber, 2020). This is partially because their capacity to change the content is limited being a third-party integration that can only read or change certain code languages. These tools are not only frustrating to disabled users, but companies may face litigation if their website is required to meet accessibility standards (Groves, 2019). These tools only cover up inaccessible design rather than resolving it.

The WordPress accessibility team ensures that all of the new official WordPress meet WCAG 2.0 AA standards. However, even though these new templates are accessible, once a person begins editing the template, there is no guarantee that the final product will be accessible (Johnson, 2020). Templates developed before 2020 are not required to be accessible, and users who have been on WordPress before 2020 may not know that there are accessible options or want to update their website with a new template. The accessibility features also focus on using industry-specific terminology and may be inaccessible to non-industry creators (2020).

Knowledge Gaps

It is clear that there is a plethora of information on why accessibility in web design is essential, who benefits from it, and how to use it. However, the researcher could not find studies on why people are still not putting this information into practice developing accessible web content. Knowing how many websites use CMS platforms (Schäferhoff, 2020) and that people use CMS platforms because they do not require web developer skills (Haught, 2019), one can conclude that CMS platforms allow people with no web design or accessible design knowledge to create websites. This stakeholder group is less likely to understand the need for accessible design or how to use accessibility features. It appears as though the stakeholder group of web content creators who are not designers or developers has been overlooked in the pursuit of accessibility research. These findings are why this stakeholder group is the focus of this study.

Methods

Research Approach

Using the *social model* to frame disability drives the idea behind this study. The International Association of Accessibility Professionals (2020) explains that the social model sees disability as "a socially created problem" (p. 7) where disability is not a trait of individuals but something society creates through inaccessible designs. This model removes the onus of finding accessible workarounds from the people who experience the created disability and places it onto the person making the product, experience or environment (p. 7). A more equitable digital world can be developed by addressing why websites are inaccessible and putting the onus back on the creators to ensure that their websites are accessible to everyone.

To ensure that the end product is usable, understandable, and easily integrated into the stakeholder's web content creation practice, this study is participant-led, with the outcome relying on the input from the stakeholder group at every phase. The participants reflected on what would most benefit them, what product elements are working, and what revisions were needed to suit their needs.

Participants and Sample

Two identified main stakeholder groups would benefit from the outcome of this study: web content creators who use CMS platforms and people with disabilities that affect their ability to navigate the web. For the scope of this study, the web content creator group was the main focus as they are the stakeholders who will interact with all aspects of the final prototype. This group is referred to as the primary stakeholders. People with disabilities have been identified as the secondary stakeholder group as they may not interact with the prototype but will benefit from the more accessible websites created with it. The researcher included people with disabilities in the primary stakeholder group if they were web content creators. The researcher chose these stakeholders because they reflect the source of the inaccessible website material and the group of people who are affected by the inaccessibility.

Tertiary stakeholder groups may also benefit from the product but are not the main focus. For example, with a simplified set of accessibility guidelines, trained web

designers and developers may find they are easier to use than the current jargon-heavy guidelines, even if they can understand them. It may also assist them in explaining accessibility to clients or coworkers who do not know about them. Non-disabled people may benefit from the product as accessible websites do not hinder a person's experience and can help provide clarity and ease of use to everyone who interacts with the content. The ideas presented in this study could also benefit social media content creators or people who run web-based newsletters because understanding and implementing web accessibility guidelines are also important for their work.

Inclusion and Exclusion Criteria

The participant sample for the primary stakeholder group was open to people with skills ranging from technicians (those with in-depth knowledge of accessibility guidelines) to technologists (those with no previous knowledge at all), and people building websites for different reasons (i.e. large corporate websites, personal portfolios, blogs, and eCommerce.) The researcher selected this diverse group to provide insight into if CMS platform accessibility options are available and used, if people with accessibility knowledge choose not to adhere to guidelines, and get a list of the most common CMS platform features.

From this group, the researcher selected three participants from the ones who agreed to participate in the subsequent phases of the study. Each participant represented a knowledge level of web and accessible design from beginner to intermediate to expert. All participants had various prior experiences with using CMS platforms, from building one website to several. The same three participants were consulted throughout the remainder of the study. Though no participant chose to do so, they had the option to drop out of the study at any time. If a participant decided to leave the study, the researcher would recruit new participants through the participants who opted to be contacted further in the survey portion of the study.

This study was conducted online, which allowed the researcher not to be confined to logistics and to reach a more diverse group of participants. However, participation was confined to English speakers in Canada with access to a computer and a stable internet connection. The accessibility guidelines the researcher focused on were WCAG 2.1, as this is a more universally accepted guideline. This study's results

and final prototype may only apply to a western, English-speaking perspective on accessibility guidelines. However, this study should be able to be replicated by other regions or cultures using their own set of guidelines and language, as the structure of this study should not be affected by these changes. The other identified limitation is that a single researcher conducted this study in a short timeframe. Therefore, the breadth of interviews and testing session participants had to be kept to a small group to be manageable. Should the researcher want to expand on this project after the study, she will need to repeat the process with a larger team and more participants to get a more generalized response to the prototype.

Ethical Considerations

This study received approval from the Research Ethics Board as it involves human participants throughout the entirety of the study. The file number for this study is 102028. Data will be kept until July 1, 2022, after which time the researcher will erase all digital data and shred all paper data. Each participant signed a consent form before participating in the study where they chose to opt into specific phases of the study, beginning with the survey (Appendix A). At the beginning of each stage, participants received a detailed session outline explaining what was expected from them and how the session would be recorded. Participants were asked for verbal consent to be recorded and have the data collected at the beginning of each phase. Participants were informed that they may withdraw from the study at any point and may withdraw their responses before the data results have been analyzed and written into the report. All data collected from participants is considered confidential. The researcher edited any data used in the final paper to remove identifying information. Data was stored on a secure, password-protected server provided through OCAD University that only the researcher (C. Typert-Morrison) can access. The data will be held until the end of the research project and will be destroyed afterward. Should the study continue beyond July 1, 2022, participants will be contacted for permission to extend the use of their data. The researcher stored only data with consent to be stored. Confidentiality has been provided to the fullest extent possible by law.

There were no known or anticipated risks for participation in this study. Prospective benefits for the participants included that they learned about accessibility

guidelines and their application throughout the process of this study and the potential development of a product that can assist them in creating accessible web content.

Key permissions were not required for recruitment from the Facebook groups. As the researcher is already a member of these groups and the post falls within the posting rules, no moderator will need to approve them beforehand. See post examples in Appendix B.

Procedure

This study used a mixed-methods approach for data collection. The research began with collecting quantitative and qualitative data through an accessible survey (Appendix C) with the primary stakeholder group for a generalized representation of opinions and experiences with accessible design and the use of CMS platforms.

The survey participants were recruited from the researcher's networks by reaching out to friends and acquaintances and posting to their undergraduate alumni Facebook group and entrepreneurial groups. The researcher also reached out to peers in the Inclusive Design program at OCAD University. The researcher selected these groups for their interest in website design and programming, and members of the entrepreneurial community commonly create websites for their businesses. The researcher also accepted snowball recruitment by allowing the recruitment opportunity to be shared by others to invite people they feel may meet the criteria and be interested in the study. In an attempt to be as inclusive as possible, this first phase only restricted participants to be English speaking, have used a CMS platform at least once, and are currently residing in Canada. These guidelines allowed diverse perspectives based on skillsets, abilities, background, cultures, and ideologies. All survey materials followed accessibility guidelines and were offered in multiple formats to allow as many people as possible to participate.

The researcher designed the survey questions to provide an overview of the stakeholder group's needs and inform what areas the prototype will attempt to address. The survey included the option to be contacted to participate in further study phases. Three respondents were selected for an individual qualitative discussion with interview questions (Appendix D) to gauge their current knowledge of web content development,

accessible content development, and preliminary thoughts on integrating these guidelines into their everyday content development practice.

The second phase included two cycles of developing prototypes that address how to assist content creators in building accessible websites and having the stakeholders test out each prototype through virtual testing sessions. Participants used a think-aloud method of narrating their actions as they interacted with the prototype and explained how each interaction made them feel. They were prompted to focus their thoughts on how intuitive the interface was, if the content was easy to understand, and if they thought that the information format made it clear enough what was causing a problem and how to fix it. The first session had the researcher asking the participants questions about their experiences and their think-aloud comments between each of the four interactions. See testing session script one in Appendix E.

A month later, participants received a link to the Asynchronous Prototype Session Two Form (Appendix F) and a copy of the Prototype Overview Document (Appendix G). The form begins with questions to test the participants' memory retention of the accessibility guidelines in prototype 1 and what caused the accessibility errors. To see if the participants used this knowledge outside of the study, they were asked if they had shared anything they learned with others or applied any accessibility guidelines to their web content since starting the study. The form is then broken into sections with questions about the prototype screens outlined in the overview document. The sections ask about the effectiveness of the accessibility checker panel, their thoughts on each of the accessibility integrations, their thoughts on the prototype overall, and their thoughts on how well the document describes the prototype. The form’s goal is to understand how effective the updated prototype is in integrating accessibility guidelines into the website development process in a way that is easy to understand and apply.

Figma was used to develop both prototypes. The initial prototype was four mid-fidelity content creation interfaces based on the content creation processes the participants had previously experienced. The interfaces included: adding images to a page and navigating how to add alternative text or marking images as decorative, how to add text over an image for a hero banner in a way that had enough contrast, how to format text to use semantic headings and ensure there were not too many or too few characters per line, and adding titles and proper text contrast to form fields.

The second prototype was a high-fidelity singular interface developed based on the participants' feedback. This prototype had the same content interactions as the previous one but blended them to have the participant create a single web page with different types of content. The accessibility side panel checked for accessibility errors constantly. It would display them with descriptions and in groupings of error types for the participant to be able to resolve before publishing.

Budget & Compensation

This project did not require a budget as the researcher already had access to all necessary software. To compensate the interview and testing phase participants for their time, the researcher offered a 30-minute synchronous or asynchronous session for the participants to get advice on making their websites more accessible upon completion of each phase of the study. Each participant stayed for all three parts of the research, giving them access to 1 hour and 30 minutes of accessibility review with the researcher. All participants were aware that if they decided to leave the study during the interview or experimentation phases, they would still receive the total compensation.

Findings

Survey Results

The survey had 18 responses in total. Participants came from various education and work backgrounds, but all had at least some prior website design and development experience. There was no correlation between the number of CMS platforms a person used and their experience in the field (based on their job titles). However, the results showed that all participants used at least one of the most common CMS platforms regardless of their expertise. These platforms included Squarespace, WordPress, Shopify and Wix.

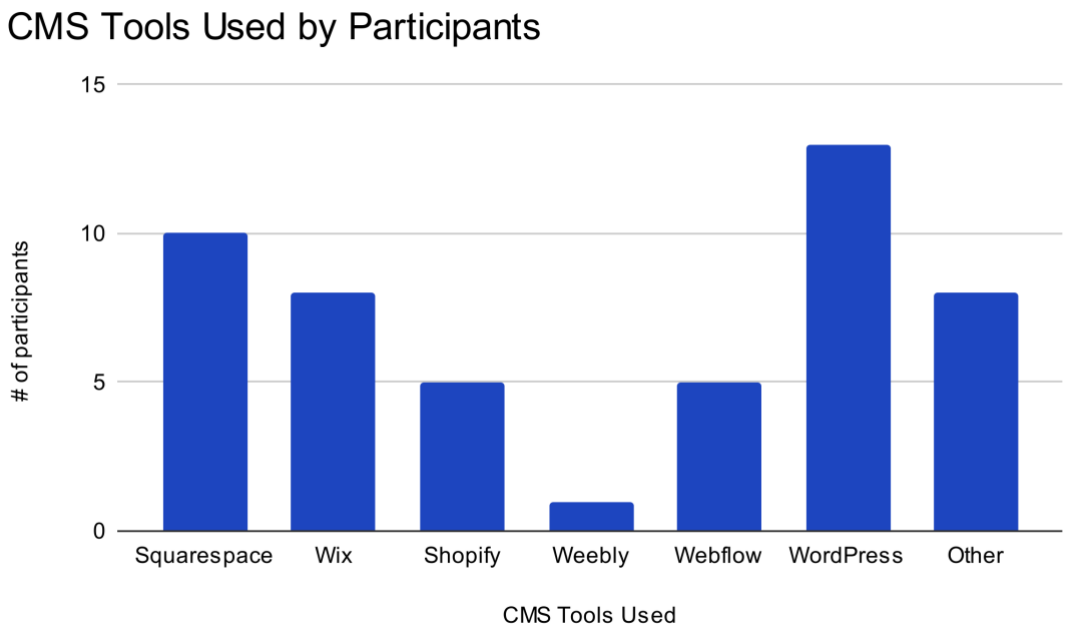

Figure 1: CMS Tools Used by Participants

Before responding to the survey, every respondent had heard of Web Content Accessibility Guidelines. There was a correlation between their field experience and how negative their perception of the guidelines was. Respondents with extensive knowledge in the field had the least number of positive responses per group. Respondents with expert knowledge had the second most negative and the second least positive responses. Those with intermediate knowledge had the most negative but more positive responses. Respondents not listed as working or in school for web design or development fields were primarily neutral, marking the guidelines as hard to find information on or that they did not know they needed to use them. Nearly all respondents acknowledged that accessibility guidelines help themselves or others navigate web content, and there were more positive than negative responses overall.

Negative	Positive	Neutral
They are hard to understand	They are something I enjoy working with	It is required by law
I use them because I have to	I understand them well	I don't know where to find information on them
They can be a hinderance to my design/development process	I use them because they help others navigate web content	No perception toward them
They are a box to be ticked at the end of a project	I need them because they help me navigate web content	I did not know I needed to use them
I use them because I have to	–	–
They are well intentioned but I'm not sure if they are helpful	–	–
They make projects take longer	–	–

Figure 2: Table of WCAG Perceptions Sorted by Negative, Positive, or Neutral Responses

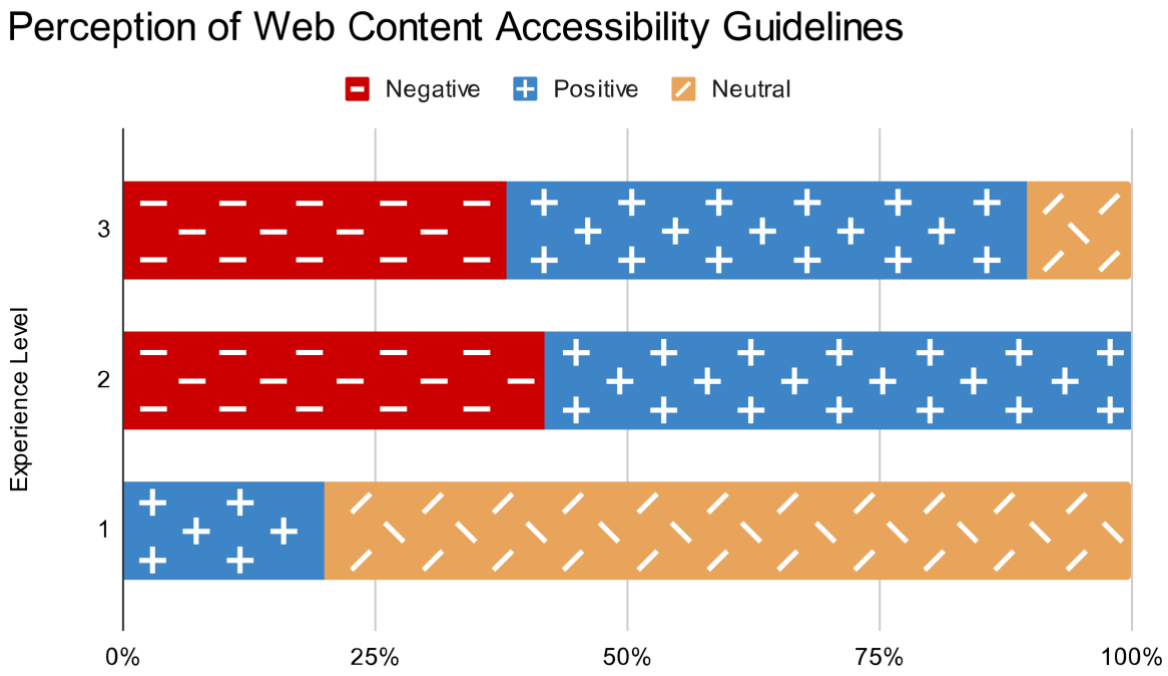

Figure 3: Perception of Web Content Accessibility Guidelines

12 of the 18 respondents listed that they learned about accessibility guidelines while making websites, and just under half of the respondents marked that they learned about the guidelines in school.

Common accessibility integrations that respondents had used previously are:

1. Using semantic heading tags
2. Adding alt text to images
3. Checking font size and readability
4. Checking colour contrast
5. Running accessibility scans

Five respondents listed that they did not know how to use accessibility options or did not find any available to them. Seven respondents did not know about or how to use accessibility checking tools outside of those in the CMS tools. All but one of these participants do not work in web-related fields. Eight respondents who work or have worked in web-related areas have used accessibility guideline evaluation scanners.

Every respondent marked that if there were a new CMS platform that promoted accessible web design, it would need to include several aspects of other CMS platforms to compete with them. Some participants said that it would not matter how many platform elements were similar to other market ones; they would not choose to use it over the ones currently available.

Interview Results

The researcher selected three participants from the survey out of the respondents who marked that they would be interested in continuing in the following phases. One participant was selected for each stakeholder knowledge group:

- **Beginner Knowledge:** This participant does not work in a web-related field and did not study website design or development. This participant has no formal training in creating accessible web content and they create web content using CMS platforms and social media for their business.
- **Intermediate Knowledge:** This participant is in a post-secondary program studying website design and development. They have learned some coding languages and have some formal training in creating accessible web content.

- **Expert Knowledge:** This participant has completed a post-secondary program related to web design and development, has a working knowledge of multiple coding languages, and is currently working as a web content creator. They have had extensive training in creating accessible web content to meet Web Content Accessibility Guidelines.

During the interviews, the participants validated that they would prefer to have a pre-existing CMS tool adopt accessibility integrations rather than have to learn a new interface. Each participant had varied responses toward using external learning avenues like workshops, resource websites, printed guides, or social media campaigns. However, each agreed that they would use the education tools integrated into a CMS platform. They felt that this would be the best way to help people quickly learn these practices in bite-sized chunks without needing to go out of their way to understand and apply them. They felt that this would remove the confusion around where to find information on these guidelines and understanding how they apply to their specific web content.

When asked what technical language level they would prefer to have the guides written in, each participant had differing viewpoints on how basic or technical they would want the descriptions. However, they agreed that offering a tiered knowledge system by starting with a short, easy-to-follow description with examples and offering a more detailed and technical explanation if a person wants to learn more.

When asked for their opinions on whether accessibility compliance should be mandatory to publish a website, the participants who had intermediate and expert level knowledge felt that this might make people less likely to use the tools or create negative feelings toward the guidelines. The participant with beginner-level knowledge thought that they would find it annoying but that they would probably still use it because they know the guidelines are there to help others. All participants felt that they would still prefer to pick and choose when to make content accessible based on who will be using the content rather than adopting them entirely into their design process. One participant suggested that, when trying to publish a website with an accessibility error, the person must acknowledge that they are aware of them and set a date and time to be reminded to return and fix them.

Testing Session Results

Each participant used the think-aloud format to explain how they felt while interacting with each interface and focus on which accessibility integrations were helpful and which ones needed to be changed to work better for them. When testing singular accessibility interfaces per content type versus having a constant accessibility checker that grouped all of the errors in one place, every participant preferred the continuous, grouped interface. They felt that it made it easier for them to understand what was causing the errors right away, and there was less clicking between interfaces to solve the problem.

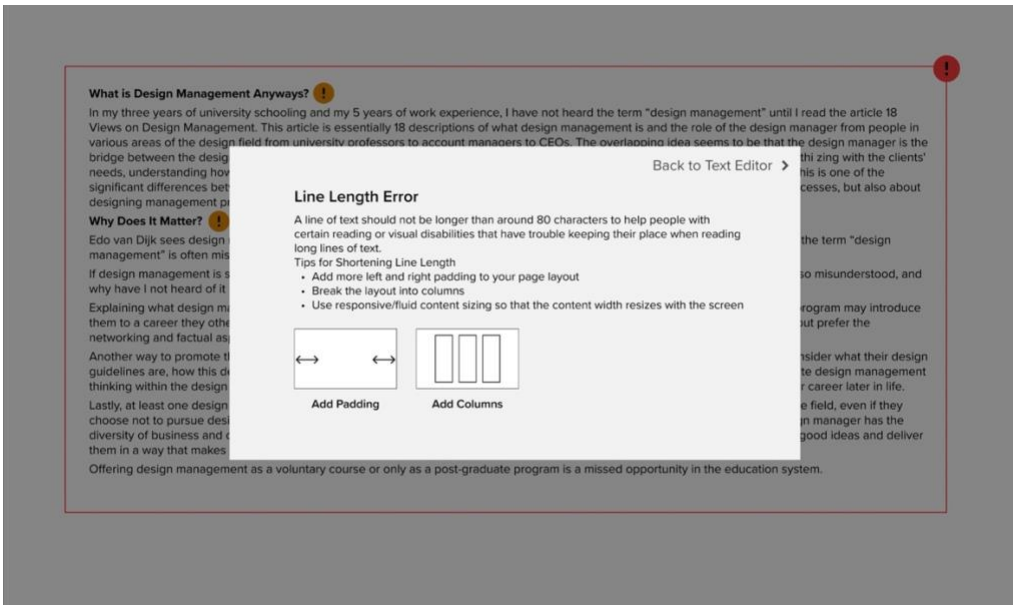

Figure 4: Line Length Error Interface

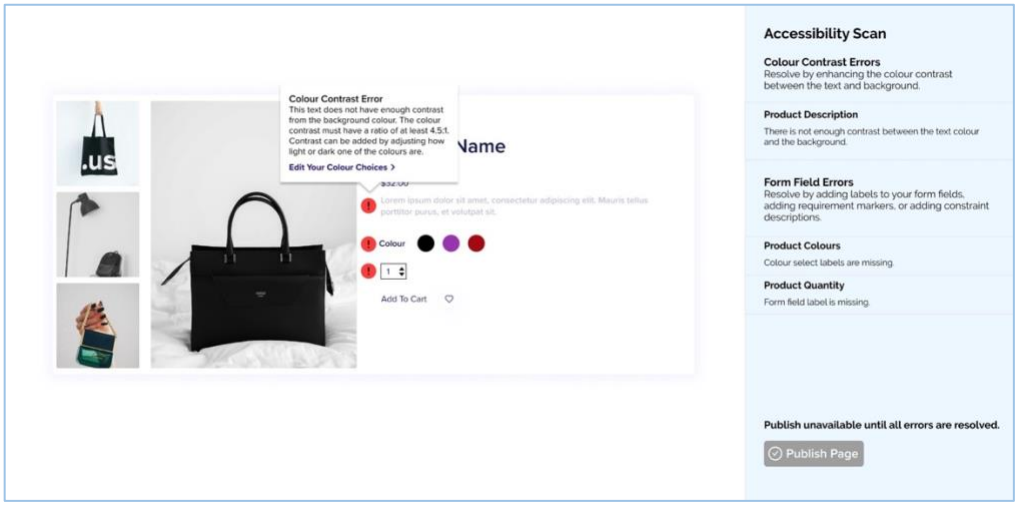

Figure 5: Accessibility Scan Interface

Participants made suggestions like making the initial descriptions about the accessibility guidelines shorter with more examples because they found that they were skimming the paragraphs of text and going straight to the examples. They also liked that the interface gave them styles to choose from for specific content types but would want to be able to click through the options after selecting one instead of needing to go back to the previous screen. They also suggested visually grouping errors when several are on a screen to convey the error type they fell under and if they were an error or a warning.

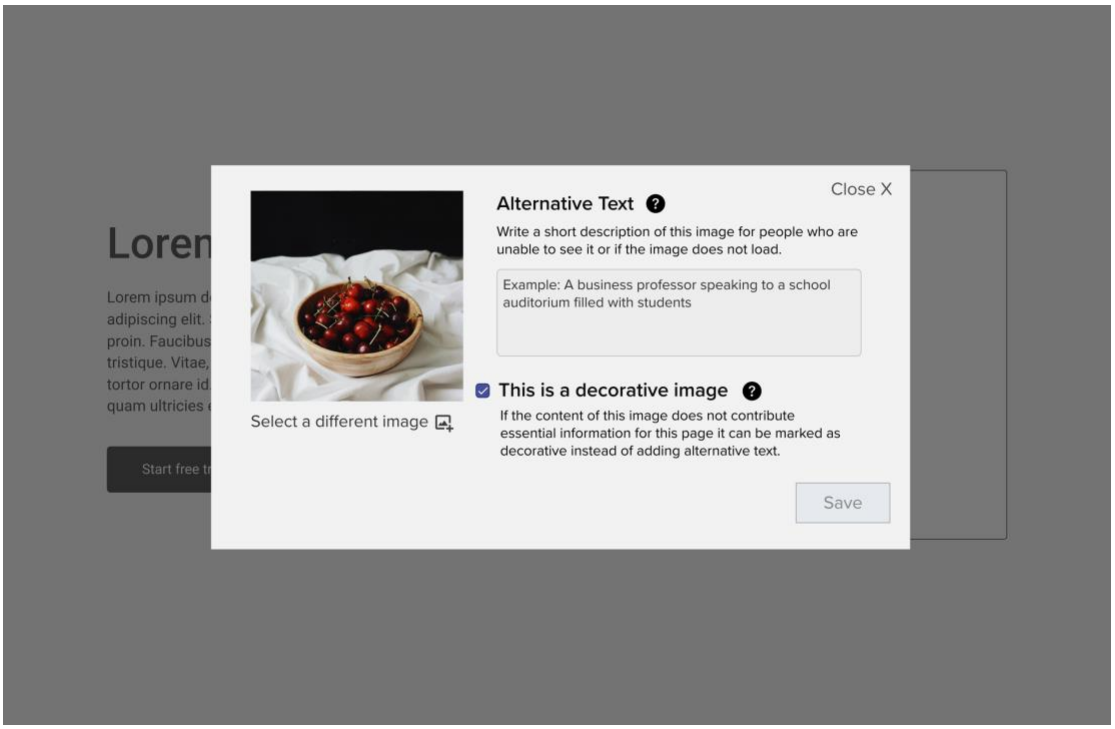

Figure 6: Prototype One Add Image Screen

The initial prototype included a decorative image selection deterrent where participants needed to go through an extra step of confirming that the image added no context to the page. The researcher used the deterrent to see if the extra effort would be annoying enough to make people more likely to add appropriate alternative text rather than selecting decorative for every image, regardless of its importance. Participants felt that this would be effective once or twice, but after knowing the process, they would likely click through without reading it, and it would not sway them if they were in a rush or didn't know what to write for the alternative text.

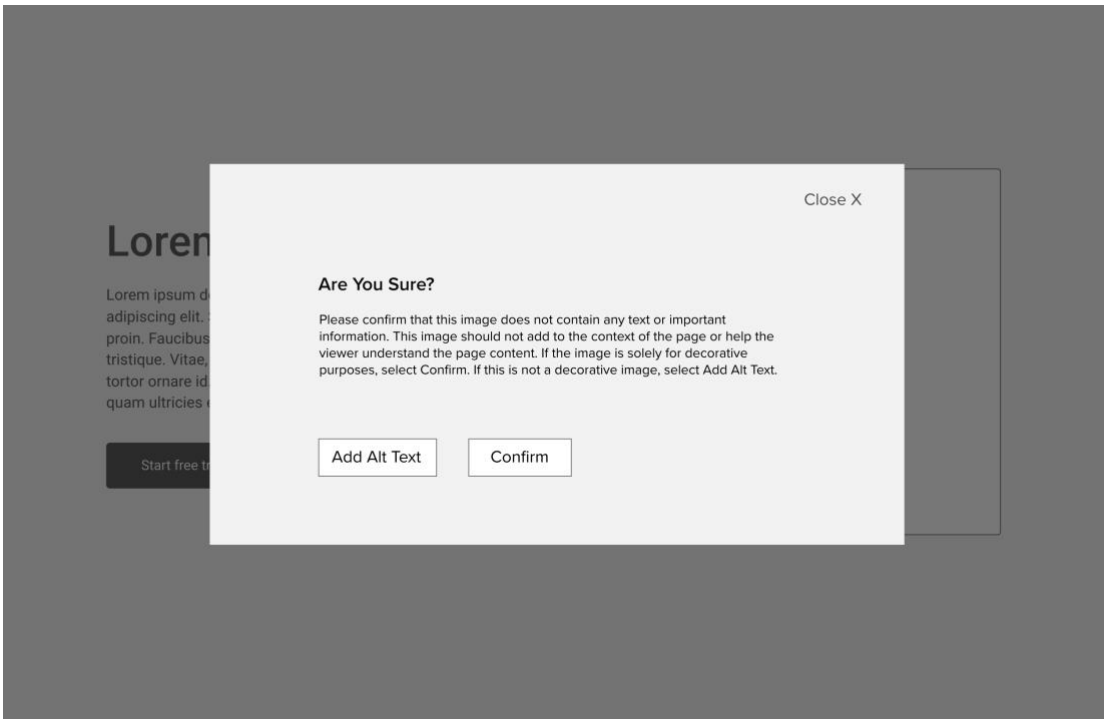

Figure 7: Prototype One Decorative Image Deterrent Screen

Overall, the participants still felt that this was the best solution to help mainstream audiences learn about and apply web content accessibility guidelines to their websites. The participants looked forward to seeing the next prototype phase, which focused on the constant checking layout with more robust features based on their suggestions.

The second testing phase was conducted asynchronously through a form, and participants were given access to the final Prototype Overview Document. In the form, participants were asked questions about their knowledge retention of the guidelines, if they shared knowledge with others outside of the study, and if they applied any guidelines to their web content. Each participant found different benefits from interacting with the initial prototype.

The participant with expert-level knowledge of accessibility guidelines did not find that they learned more about the guidelines themselves. However, they found it easier to explain the purpose of these guidelines and why they are essential to their clients who do not have accessibility knowledge. The participant mentioned that they could better explain why the project they were working on should meet accessibility guidelines to create a better experience for the people interacting with their product regardless of if they are disabled or non-disabled.

The participant with intermediate knowledge of accessibility guidelines had a good level of knowledge retention and mentioned that they have now been making sure to add alt text to all of their imagery. They also have been bringing web content accessibility guidelines and the AODA laws up in conversation with their professors and peers. The participant found that many of them are shocked that these are not more well known.

The participant with beginner-level knowledge of accessibility guidelines had a good level of knowledge retention weeks after interacting with the prototype. They remember what alternative text and decorative images are and how they are helpful. They recognized the importance of using semantic headings for web content and that characters per line can alter a person's ability to read text. They were also able to remember that text needs a certain amount of contrast to be readable, and they recalled a few examples of how to create better contrast for text over images. They mentioned that they had not had a chance to apply this new knowledge to any web content yet but started using some of these concepts in their work designing fabric prints with text for garments and accessories. They also planned to add discussions about accessibility with all of their freelance clients from now on.

When reviewing the Prototype Overview Document (Appendix G), all participants felt that this product would help people become more aware of web content accessibility guidelines and be able to use them in their content creation processes. One participant likened the accessibility checker to Grammarly, writing software that provides spelling and grammar suggestions as you add to your document. Another mentioned that other types of software they work with use side panels to convey information, and it would be an intuitive place for many people to access the information.

The participants felt that tools like the colour blindness checker might help reduce the stigma around colour blindness by helping people understand it better. They also felt that the prompt system would be beneficial to those first learning about the guidelines but would also help more experienced designers who may have missed something as they were building or forgotten about a certain guideline.

Every participant felt that the option to publish with errors and fix them later would help people adjust their habits over time and learn at their own pace. They

agreed that having them acknowledge the errors would help people think twice about publishing the content, and the email reminders after would likely have people return to fix the errors.

Proposed Solution

From the survey and interviews, it was clear that the most effective way to integrate accessible design practices into the web development process of mainstream audiences was to blend them into pre-existing CMS platform interfaces. The final prototype shows an example CMS interface with a grouping of accessibility guidelines integrated with the content development process. The prototype includes common web content processes like adding images, creating a hero banner with text over an image, creating text-only content, and adding forms.

One of the key features of the prototype is the accessibility compliance checker. This tool appears on the side of the screen and scans the website's content to see if it meets most Web Content Accessibility Guidelines. If a website is compliant, the web content will be accessible to most people who access it. Though a website can never be 100% accessible because no one can design for every kind of human diversity, this tool is designed to help people create content that is as accessible as possible.

The checker appears as a side panel that constantly scans for accessibility errors as content is added to the website. When no errors are found, the checker will display a list of content that the creator must manually check. The list explains that even though the tool did not find any accessibility errors, this still does not mean that the website is entirely compliant.

When errors are found, they appear in the side panel with a corresponding icon next to the content that is causing the problem. The content creators will be able to open a dropdown to read a brief description of the error and who benefits from the content being accessible. There is also a list of tips to fix the error and a visual example of the accessibility guideline in use.

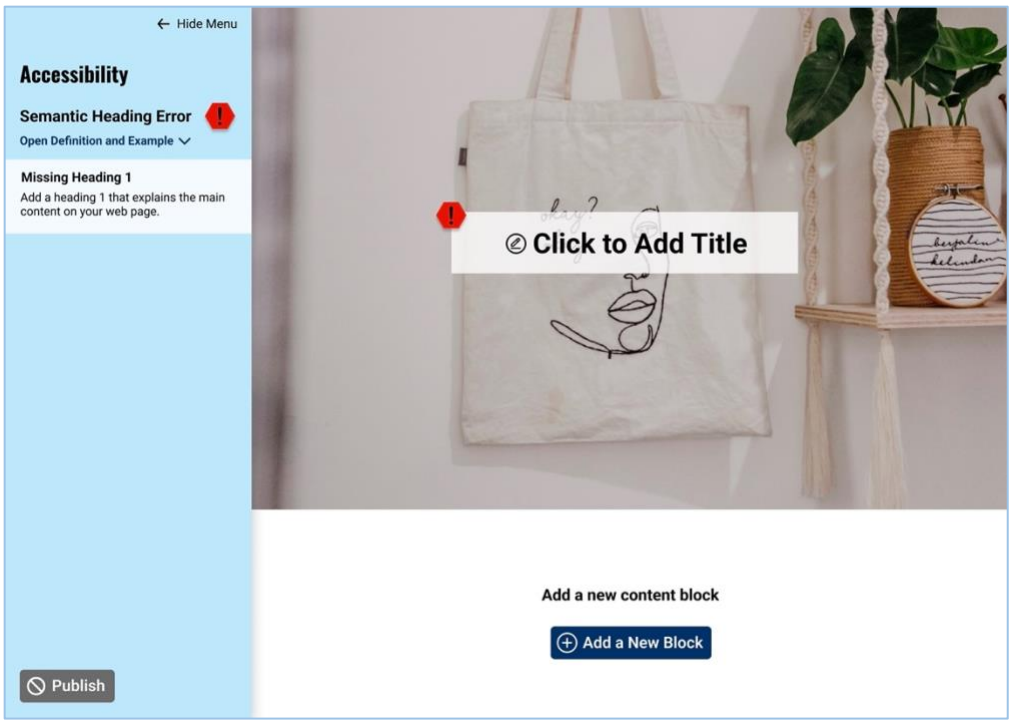

Figure 8: Semantic Heading Error Screen

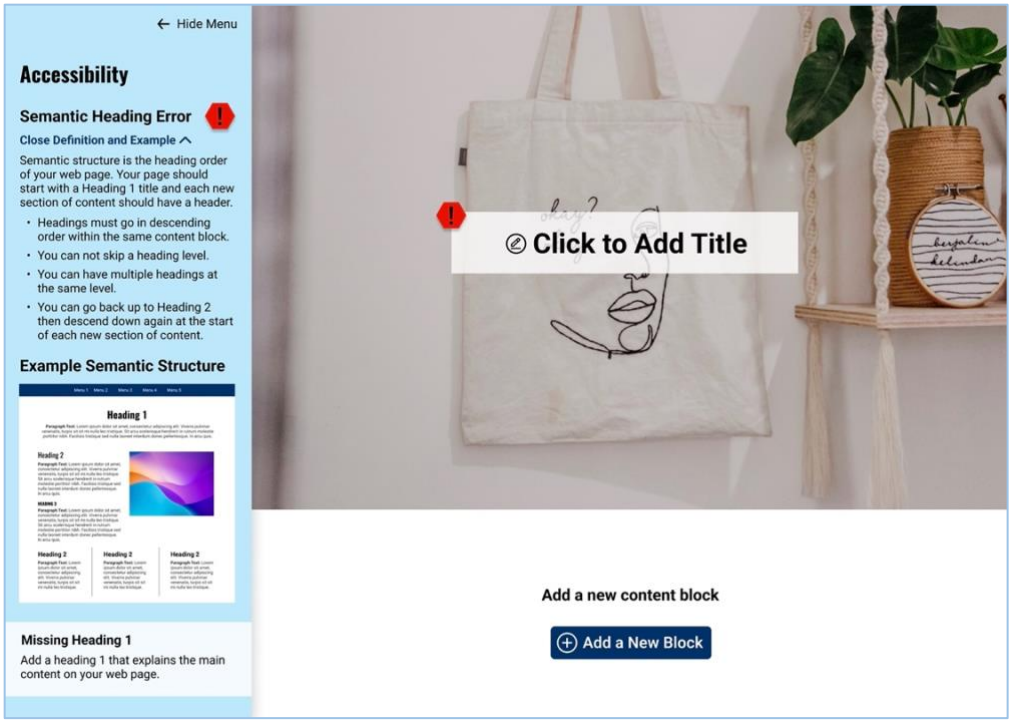

Figure 9: Semantic Heading Error Definition Screen

Hovering over an error will highlight the icon on the page and vice versa. Selecting an error will make a popup appear with a solution prompt. This prompt will show how the errors can be resolved with links to take you to the interface that will fix them.

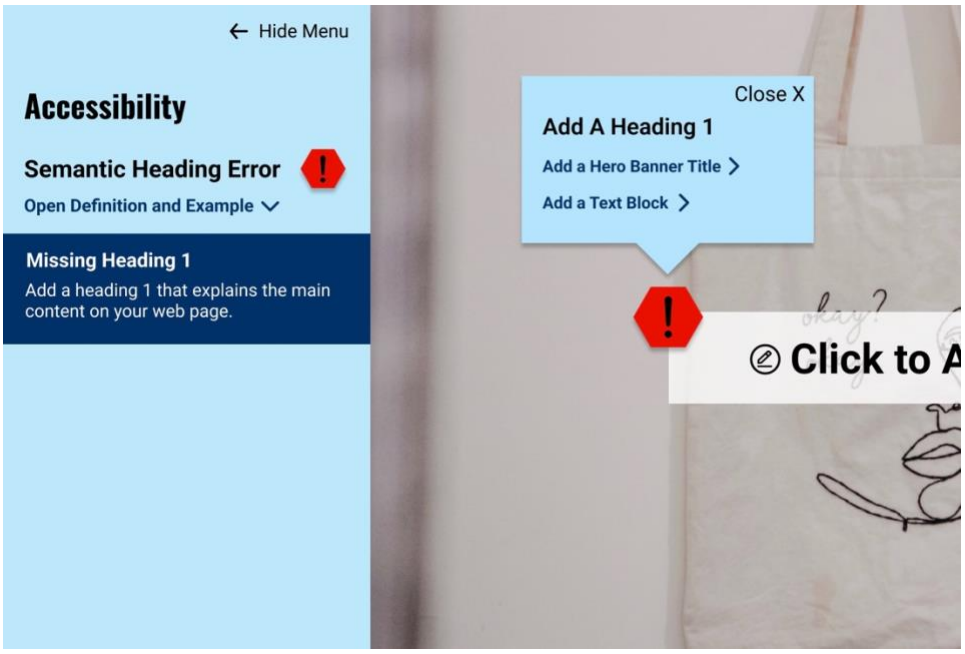

Figure 10: Semantic Heading Error Fix Screen

When there are multiple errors on the page, they are grouped by error type. Each error type has a representative symbol. These symbols help people identify what is causing an error or where the description is in the side panel.

This compliance integration aims to help content creators address accessibility errors as they appear rather than after completing a page to help people integrate accessibility from the beginning. The goal is to remove the stigma that making accessible websites takes more time and effort than inaccessible ones.

There are also integrations at the micro-level of content development. When adding images to the website, people must add alternative text or mark an image as decorative before they can save it. The interface will show a short, plain language description of alt text and decorative images and when to use them. Content creators can also read a lengthier, more technical definition with more examples in another panel. To help better differentiate between the two fields, if one is selected, the other will be greyed out and unusable.

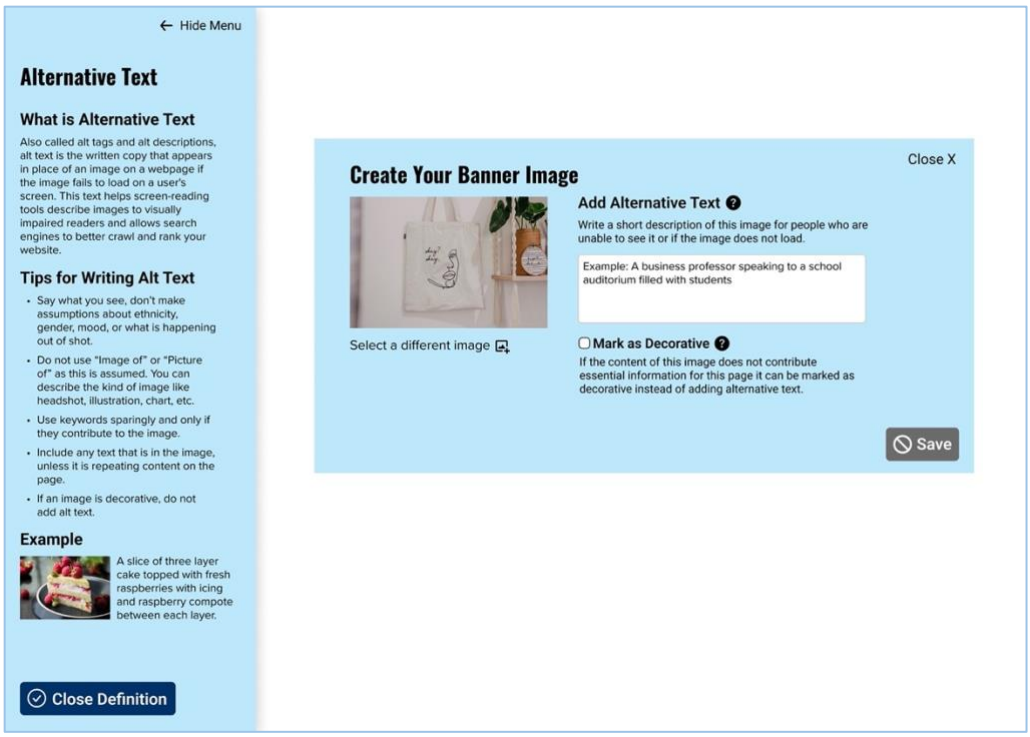

Figure 11: Alternative Text Technical Definition Panel

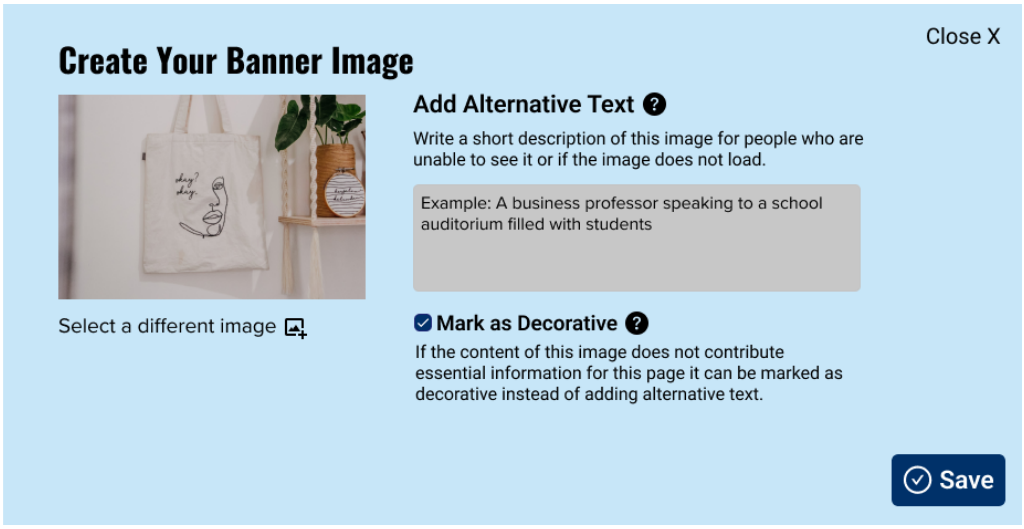

Figure 12: Alternative Text and Decorative Image Differentiation

When adding text over an image or coloured background, a colour contrast checker has been added to the colour selection process to ensure enough contrast for readability and colour blindness. The colour contrast ratio updates as the colours in the text or background selections change, showing the ratio number and if it passes or fails.

Figure 13: Colour Selection Screen with Contrast Ratio

There is an option to check the colour contrast for different colour blindness in the colour selection screen. This dropdown shows the kinds of colour blindness between the red-green deuteranopia and protanopia colour blindness, the yellow-blue tritanopia colour blindness, and the complete lack of colour, which is monochromacy. Though colour blindness can range in severity, and some are more common than others, the tool will ensure that everyone will have enough contrast if people with the most severe or rare cases have enough contrast.

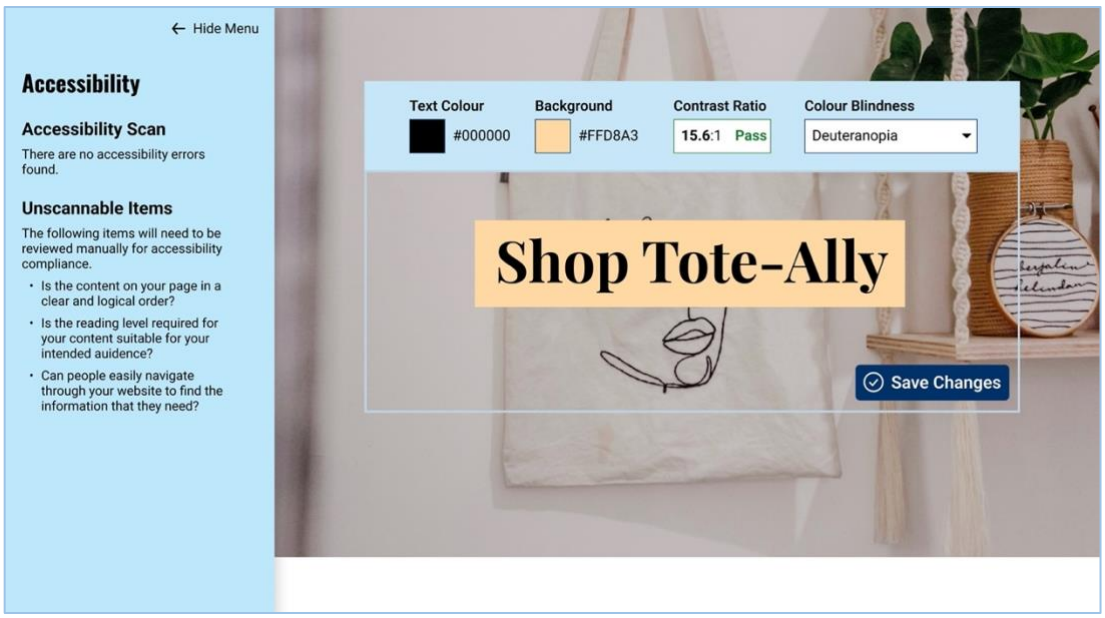

Figure 14: Deuteranopia Colour Contrast Screen

When adding text over an image, the interface comes with pre-set styles to help promote more contrast between text and the image. These include having a background directly behind the text, a translucent screen over the whole image, or no background if the image is not too busy. Selecting a Style will show a preview of it using the content on the screen. Selecting Open Options will show more customizations for the style, like text placement or background opacity.

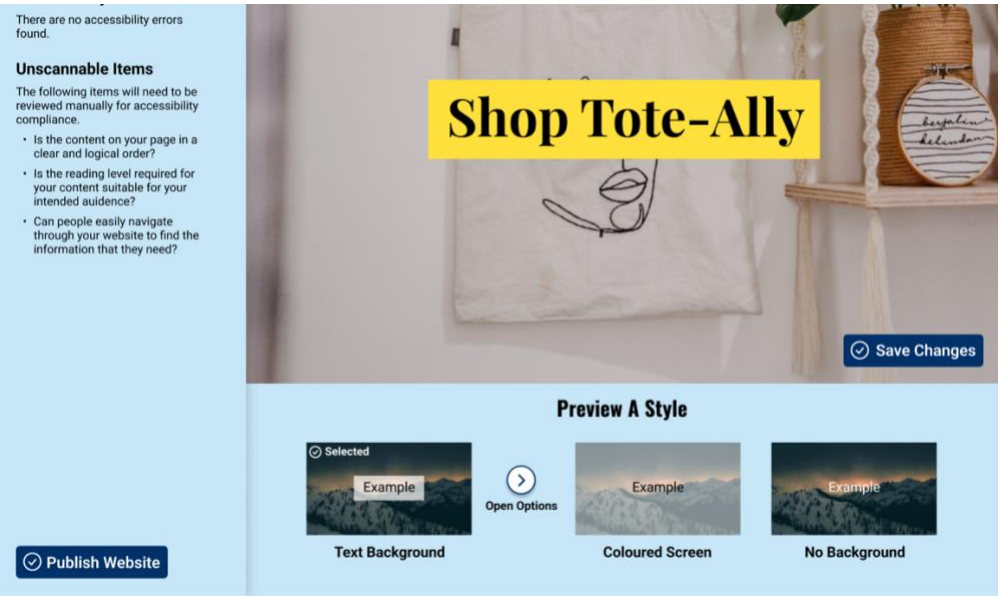

Figure 15: Text Over Image Style Selection

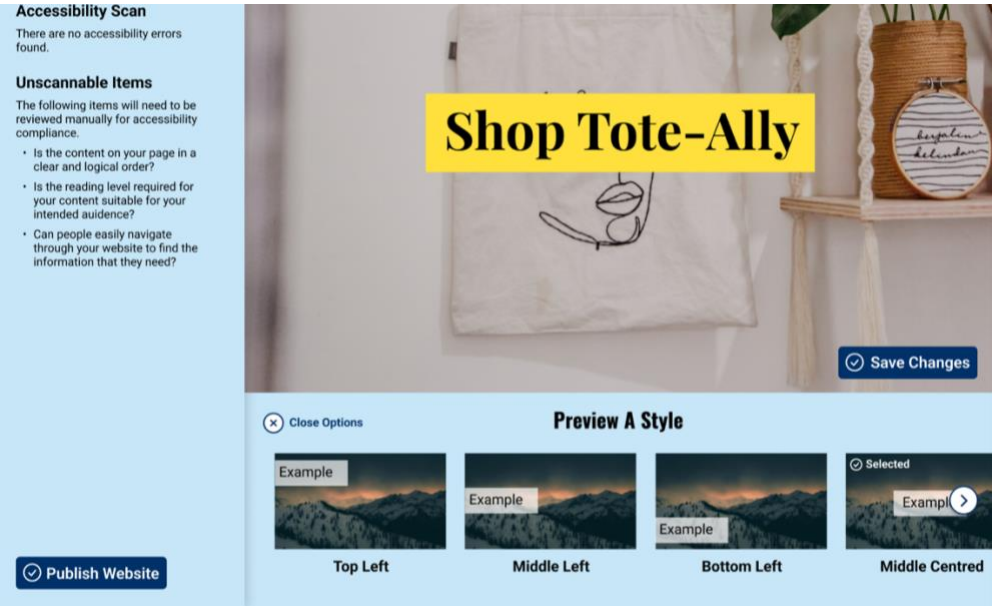

Figure 16: Text Over Image Style Options

Semantic headings are separated from the text styling to make it easier to have properly nested headings without sacrificing the page's design. The accessibility

checker will create an error if a heading level is skipped or a Heading 1 tag is missing from the page. The checker can also generate warning messages if the text is formatted to look like a heading but is not tagged as one.

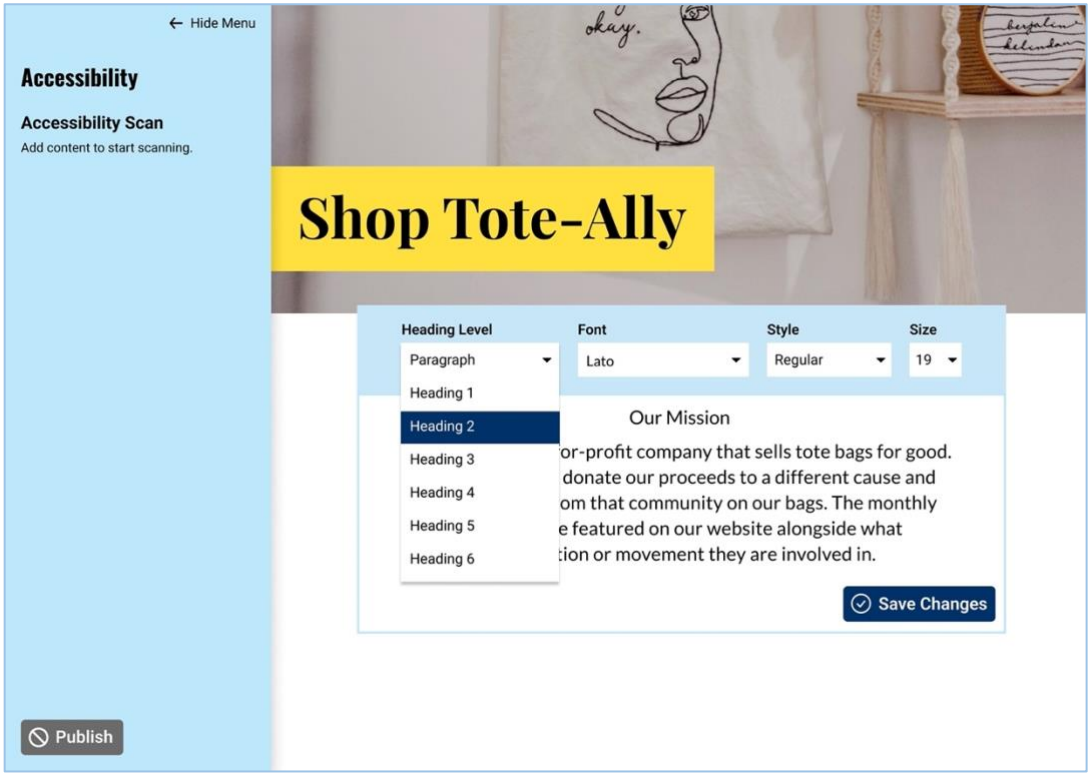

Figure 17: Semantic Heading Level Selection Screen

There are two primary accessibility integrations for adding forms. The first is ensuring that all form fields have proper titles that clearly explain what information is needed. These titles should sit outside of the input field itself so that once a person begins typing or choosing content, the title is not lost. The second integration is labelling options that rely on colour or images. Adding a title to each visual option, like colour selections, ensure that people who cannot see the colour will still be able to understand what they are choosing.

Lastly, there are two different ways publishing can work with this prototype. The first is to make accessibility mandatory. In this version, the Publish button will not be able to be used until all accessibility errors are fixed. Once the scanner detects no more errors, the Publish button will change from grey to blue, and the icon will change from being crossed out to a checkmark. This option allows a CMS platform to promote that all websites published using their software have passed a compliance scan.

The second option would still enforce the guidelines as much as possible. However, content creators will have the option to acknowledge and publish with accessibility errors. They will have 30 days to return and fix the errors before the website is unpublished. The system will prompt the person to schedule an email reminder to return and fix the errors to ensure that people do not abuse this to continue making inaccessible websites.

This option allows content creators to publish their websites if they are on a time crunch while acting as a deterrent to keeping the inaccessible content published for long periods. CMS platforms that use this version will not be able to claim that all of their websites meet accessibility compliance, but people be able to adapt to creating accessible content over a longer period time.

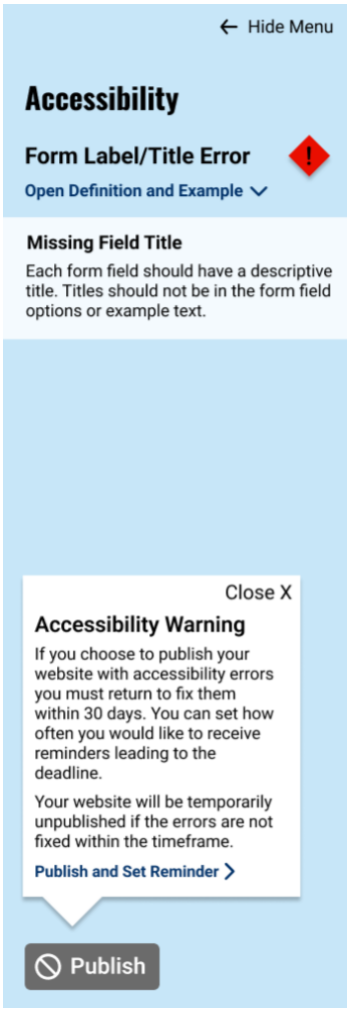

Figure 18: Publishing With Warning Prompt

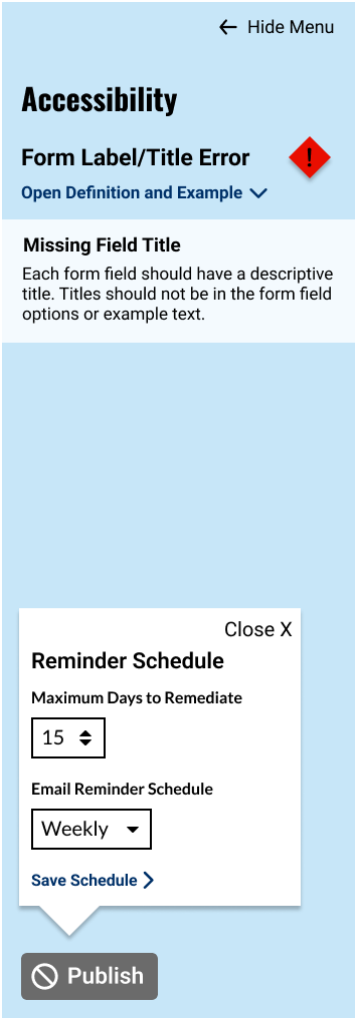

Figure 19: Reminder Schedule Prompt

This prototype was co-designed with three participants who represent beginner, intermediate, and expert levels of accessibility knowledge to ensure that people of all skillsets could find a benefit to this product. Giving everyone the power to create accessible content shifts the onus to the content creators from the people affected by the inaccessibility.

Accessible websites benefit everyone, and I hope this project can inspire change toward a more accessible digital world. Existing CMS platforms can take this example and apply this example to their interfaces. This worthwhile effort would require developers to build these integrations or work with open-source accessibility developers to use their existing products like accessibility scanners and contrast ratio checkers. Accompanying materials that they may benefit from would be short video tutorials or blog posts on their Help sections explaining these new integrations, how to use them, and why they are important. These companies could send surveys to see what their customers think of these new integrations once they are applied to collect data on their effectiveness and proposed updates that may add to a better product experience.

Conclusion & Future Work

This study shows that reinterpreting WCAG can effectively teach people about making accessible web content, help people better understand why creating accessible content is essential, and help spread accessible design knowledge beyond the CMS interface. There is still a long way to go to change people's opinions on using WCAG in their work. However, there is hope that as these guidelines become more well-known to mainstream audiences, web content practices may shift to integrating these from the beginning, and it will not feel as though they need to change their style to accommodate them.

The integrations proposed in the prototype are simple features that any CMS platform today could use. These features already exist across several browser plugins, software, and open-source tools. They would only require the CMS developers to decide how these features will integrate into their current interfaces. CMS platforms that make this update could use these features to set themselves apart from their competitors, especially to potential clients whose websites are required to be accessible

by law. As the more popular CMS platforms begin promoting accessibility features, one can only assume that others will follow to keep up with the trends. This change would mark the beginning of a wave of digital accessibility knowledge amongst mainstream audiences yet to be reached.

The concept of making accessibility integrations more known can and should spread beyond CMS platforms. Social media platforms are slowly integrating elements like alternative text for images and automatic captions for videos. However, these integrations need to come with information on how to use them and why their audiences should use them. Software like Adobe InDesign, Adobe Acrobat, and Microsoft Word are also capable of creating accessible digital documents. However, these options can be complicated, hard to understand, and hidden away in the menu options.

Giving everyone the power and knowledge to create accessible content shifts the onus of making content accessible to the content creators rather than the people affected by inaccessible content. Accessible websites benefit everyone, and it is the hope of the researcher that this project can inspire change toward a more accessible digital world.

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Appendix

Appendix A: Informed Consent Letter & Form

The interactive consent form can be found on Microsoft Forms. The Informed Consent Letter is available on Microsoft Word and linked at the beginning of the Consent Form. These consent documents will also be available in interactive PDF format, may be physically printed and sent back through email, or can be read to the participant via recorded voice call and the participant can provide consent orally.

The contents of the letter and form are outlined below.

The Inaccessibility of Accessible Web Design – Informed Consent Letter & Form

PURPOSE OF RESEARCH

Problem:

Over 1 billion websites have been built using a content management system (CMS); more commonly referred to as website templates or builders. However, less than 10% of websites meet accessibility standards. Most CMS tools do not teach users how to create accessible content and do not ensure websites are compliant before they are published. The alternative accessibility overlay tools are ineffective and only provide a quick-fix solution. These products do not address the main problem: people are continuing to build inaccessible websites even with accessibility standards in place. Until we address why people are not building accessible websites, the onus for creating accessible workarounds will continue to be placed on people with disabilities. Now that anyone with an internet connection and an email address can be a web content creator, it is more important than ever for the general public to understand how to make their content accessible.

Challenges:

- Developing a deeper understanding of the knowledge of web accessibility guidelines for people outside of the accessible web design and development industry.
- Garnering a better idea of the people who use CMS tools, what purpose they use them for, and what features make them choose specific ones.

- Developing a prototype with the primary stakeholder group that will address the problem while easily integrating it into their web content practices.
- Creating a terminology system for web accessibility guidelines that removes industry jargon for easier understanding by the general public.

Research Questions:

- Are people who use CMS tools to develop websites creating accessible content and if not, why?
- How might the researcher and participants from the primary stakeholder group co-design a prototype of a product that ensures that websites built using CMS tools are:
    - compliant with WCAG 2.1 guidelines
    - explains accessibility guidelines in terms that are easy to understand and apply by anyone
    - has a simple and easy to use interface or can be integrated with existing CMS website builders

What You Will Be Asked to Do in the Research:

There are three phases of this study that you can participate in.

The first phase is a digital survey that is focused on collecting information about what CMS tools you have used, why you chose those specific tools, what you know about accessible design and web accessibility guidelines, and if you have used any of the accessibility options in the CMS tools you have used.

For the second phase, 3 of the participants that have agreed to be contacted about participating further will be selected to participate in a follow-up interview and activity. Participants will be selected based survey responses to create a participant group with varied skillsets and accessibility knowledge.

Participants will be contacted in mid-August to verify their interest in participating. Should any of the selected three decline, other prospective participants will be contacted toward the end of August with the finalized participant group being selected by the first week of September.

This interview will last approximately 40 minutes to 1 hour and will be conducted over video or voice call on Zoom. This interview will ask for further details about your survey responses and ask about potential accessibility integrations into your web content development practice. The activity will have you quickly interact with a prototype comparing inaccessible and accessible interface designs to get you thinking about how easy accessibility options can be to learn. You will then look at specific accessibility guidelines and react to how clear they are and what changes you would suggest making.

For the third phase, participants from the follow-up interview and activity will participate in two prototype testing sessions. The first session will be testing a digital paper-based prototype to test the general concept of the solution and providing feedback or potential changes. The second session will be testing a mid-fidelity digital prototype that reflects the suggestions from the initial test. Both testing sessions will be done virtually through Zoom.

Risks and Discomforts:

There are no foreseen or anticipated risks from your participation in this study. However, to further ensure this, all sessions will not exceed a single hour. If you need to take a break to stretch or step away from the computer at any time you will be allowed to do so. You will also have the option to end a session early if need be. You will be reminded of this at the beginning of each session.

Benefits of the Research and Benefits to You:

Prospective benefits for you include learning about accessibility guidelines and their application throughout the process of this study and the potential development of a product that can assist you in creating accessible web content. Creating accessible web content is not only beneficial for creating a more inclusive digital space for everyone, it will also help your web content be accessible to more people and can add to your SEO.

Compensation for Time:

At each phase after the survey, you will be compensated with a 30-minute session with the researcher to review your current web content and get advice on accessibility updates that you can make. The researcher is trained in AODA web accessibility testing which is equivalent to WCAG 2.0. Participating in the follow-up interview and both

prototyping sessions means you will be able to redeem this session three times equating to a 90-minute session.

Voluntary Participation:

Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of your relationship with the research or OCAD University either now, or in the future.

Participants that withdraw from the study will still be compensated for their time in full for the phases that they fully or partially participated in.

Publication of Results:

Results of this study may be shown in classroom presentations, documented in a final report, and presented in the final defense. In any such presentation, the collected data will be anonymized. Video, audio, and photographic recordings will not be presented without your permission.

If you wish to receive results about this study, please contact the student researcher: Chloe Typert-Morrison at chloe.typertmorrison@ocadu.ca.

Withdrawal from the Study:

You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, OCAD University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible. The last date to enroll in the study June 30, 2021.

Confidentiality:

All information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Interviews and prototype testing will be video and audio recorded. Data will be stored in locked cabinets at the researcher's residence and on a secure, password-protected server provided through OCAD University that only the researcher (C. Typert-Morrison) can access. The data will be stored until the end of the research

project and will then be destroyed. Confidentiality will be provided to the fullest extent possible by law.

Questions About the Research?

If you have any questions about this study or require further information, please contact Chloe Typert-Morrison at chloe.typertmorrison@ocadu.ca. This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University #2021-51. If you have any comments or concerns, please contact the Research Ethics Office manager Christine Pineda, cpineda@ocadu.ca, 416-977-6000 x4368

Legal Rights and Agreement:

I agree to participate in this study described above. I have made this decision based on the information I have read in the Informed Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

I wish to participate in/potentially be contacted to participate in the following aspects of the study:

1. I wish to participate in the Preliminary Survey
    a. Yes
    b. No
2. I wish to be possibly contacted to participate in a Follow-Up Interview
   You must participate in the Preliminary Survey to participate in the interview.
    a. Yes
    b. No
3. I wish to be possibly contacted to participate in two Prototype Testing Sessions
   You must participate in the preliminary survey and follow-up interview to participate in this phase.
    a. Yes
    b. No
4. I wish to receive feedback about this study (e.g. news about presentations of our results.):
    a. Yes

   b. No
5. I agree to let whole or parts of video/photographic recordings from the study be used for the presentation of the research results. All distinguishing features such as face, name and voice will be obscured or given a pseudonym for privacy:
   a. Yes
   b. No
6. First Name (or preferred name):

   _____
7. Please provide one form of contact information to verify you have submitted the consent form and for further contact if you chose to participate in other phases after the survey.
   a. Email
   b. Phone
8. Email Address (this only appears if email is selected)

   _____
9. Phone Number (this only appears if phone is selected)

   _____
10. I consent to participate in The Inaccessibility of Accessible Web Design study conducted by Chloe Typert-Morrison. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My clicking the box below indicates my consent.

I consent to participate in this study ___

11. Today's Date:

    _____

After the person clicks submit they will receive this message:

Thank you for your assistance in this project. Please keep a copy of this form for your records. You may now fill out the Preliminary Survey here https://forms.office.com/r/sfgDFWaBY1.

Appendix B: Recruitment Messages

For Facebook Groups:

Hi everyone. My name is Chloe, I am a user experience and web designer and I am working on my Major Research Project for the Inclusive Design MDes program at OCAD. I am currently looking for participants to join in my study focusing on addressing why most web content still does not meet web accessibility guidelines. I am looking for anyone 18 and older who has ever used a website builder like Squarespace, WordPress, etc. and lives in Canada. You are not required to know anything about accessibility guidelines to participate in this study.

If you are interested, please fill out the consent form below. If you require an alternative format for the consent form please contact chloe.typertmorrison@ocadu.ca. In this consent form, you can select which of the three phases of the study you are interested in participating in.

https://forms.office.com/r/qnxSPhF2iQ

The first part of the study is a preliminary survey to get a generalized look at who uses website builders/CMS platforms, why people use these tools and the general public's current knowledge of web accessibility guidelines.

There is no obligation to participate in this study. You may withdraw from the study at any time. Please do not post any personal information or survey answers in the comments, they will not be anonymous.

Please feel free to share this with anyone that you feel fits the criteria or may be interested in this research. If you have any questions, please contact chloe.typertmorrison@ocadu.ca.

For Friends & Acquaintances:

Hi [person's name]. I am working on my Major Research Project for the Inclusive Design MDes program at OCAD and am looking for participants to join in my study focusing on addressing why most web content still does not meet web accessibility guidelines. I am looking for anyone who has ever used a website builder like Squarespace, WordPress, etc. and lives in Canada. You are not required to know anything about accessibility guidelines to participate in this study.

If you are interested, please fill out the consent form below. If you require an alternative format for the consent form please contact chloe.typertmorrison@ocadu.ca. In this consent form, you can select which of the three phases of the study you are interested in participating in.

https://forms.office.com/r/qnxSPhF2iQ

The first part of the study is a preliminary survey to get a generalized look at who uses website builders/CMS platforms, why people use these tools and the general public's current knowledge of web accessibility guidelines.

There is no obligation for you to participate in this study, choosing not to participate will not affect our relationship in any way. Please feel free to share this with anyone that you feel fits the criteria or may be interested in this research. You may withdraw from the study at any time. Feel free to reach out if you have any questions.

Appendix C: Survey Questions

All questions in this survey are optional and may be skipped if the participant does not wish to respond to them. The only questions that may not be skipped are selecting that they have submitted the consent form and providing their name and contact information for confirmation. They will also need to provide an email address if they choose to be entered into the gift card draw.

1. I have read the Informed Consent Letter and completed the Consent Form from the link in the description or through an alternative format.
    a. Yes
    b. No
        i. Selecting No takes the person to a message that says You must complete the consent form before participating in this survey. You can find the link here https://forms.office.com/r/qnxSPhF2iQ.
        ii. I have completed the consent form and am ready to continue.
            1. Yes (this choice allows them to continue with the survey)
2. First Name (or preferred name) used in the Consent Form.

    _____
3. Please enter the email address or phone number you used for your contact information in the Consent Form.

    _____
4. What website builders have you used? You may select multiple
    a. Squarespace
    b. Wix
    c. Shopify
    d. Weebly
    e. Webflow
    f. WordPress
    g. Other (please specify)
5. Why did you choose to use a website builder instead of coding a website or hiring someone to make one? You may select multiple
    a. It is less expensive
    b. It was easier to build it this way

    c. I had a limited timeframe to make a website
    d. I wanted more control over the design and content
    e. I know how to design websites
    f. Other (please specify)
6. What was/were the website(s) for? Select all that apply
    a. My company
    b. Personal portfolio
    c. Personal interest (example: hobby blog)
    d. For a school project
    e. For someone else's work/portfolio/interest
    f. Other (please specify)
7. What is your current job title?
    a. Text box for participant to write in
8. Do you know what Web Content Accessibility Guidelines are?
    a. Yes
    b. No
    c. Somewhat (please specify)
    d. Other (please specify)
9. How did you hear about them? Select all that apply (this will only show if the participant selects yes in the question above)
    a. The government requires my website to be compliant
    b. It is company policy that we implement accessibility guidelines
    c. I am/know someone with a disability that requires websites to be accessible in order to use them
    d. I learned about them in school
    e. I learned about them while making websites
    f. Other (please specify)
10. When using website builders, did you use any of their accessibility features (if applicable)? Please select all that apply.
    a. Adding alt text to images
    b. Using tagged headings (heading 1, heading 2, etc)
    c. Checking colour contrast
    d. Checking font size and readability

    e. Enabling video and gif controls (captioning, volume, pause/play functions)
    f. Adding an accessibility overlay (a tool that shows on the website that allows someone to change the text size, colour contrast, or enables voice-over)
    g. Running an accessibility scan before publishing
    h. Other (please specify)
    i. I wanted to but could not find the option
    j. I did not use/know about these accessibility options
    k. None of these options were available
11. When building your website, did you use any accessibility tools outside of the website builder? Please select all that apply.
    a. Colour contrast checker
    b. Text over image contrast checker
    c. Font readability checker
    d. Colour blindness checker
    e. Accessibility Guideline scanner
    f. Other (please specify)
    g. I did not use/know about any accessibility tools
12. If a new website builder came out that helped people make accessible websites, what features would it need to have for you to choose that over one of the other website builder options? Please select all that apply.
    a. Professionally designed templates to start with
    b. A simple user interface with clear instructions
    c. eCommerce integrations
    d. Pre-loaded colour palettes and font choices
    e. Analytic tracking
    f. Other (please specify)
    g. I would not use this over other market options regardless of features
13. Would you like to be entered into the draw for a $20 Amazon Canada digital gift card?
    a. If yes they will be prompted to input the email address they would like the gift card sent to if they win.

Appendix D: Sample Interview Questions

The interview questions will depend on the results of the survey and will be open-ended to stimulate conversation. Below is a list of likely potential questions. Questions will be selected based on the flow of conversation and not all questions may be asked depending on the time.

1. Tell me about your experience with using website builders.
    a. What did you like most about [website builder name]?
    b. What were some things you wish were improved?
    c. Why did you choose to use that one over the other options?
2. Tell me about what you know of web accessibility guidelines?
    a. To whom do you think these guidelines apply?
    b. Do you know where to find information about these guidelines?
    c. Have you ever tried to learn about them or how to use them?
        i. Did you find this difficult?
        ii. What do you think caused these difficulties?
    d. Who do you think benefits from accessible web content?
3. Did you use any of the accessibility features for [website builder name?]
    a. How did you know where to find them?
    b. Did you find them easy to use or did you need to find other resources to explain what they were/how to use them?
4. If a new website builder came out that focused on designing accessible websites would you be interested in using it?
    a. What other features would this site need to offer for you to consider using it over one of the other website builders?
    b. If [website builder name] better explain how to make your website accessible, would you prefer to use that over a new builder?
5. If there was a resource guide for web accessibility guidelines specifically for people who don’t know about accessible design, would you use it to make your website more accessible?
6. Would you integrate these guidelines into all of the content you make, selectively choose what to make accessible, or probably not do this extra step unless you have to?

    a. Would you go back and update your current websites to be more accessible or only apply these guidelines going forward?

7. What do you think would be more effective for getting anyone who uses website builders to make accessible content: a website builder specifically for building accessible websites, more accessibility features with better descriptions built into existing website builders, or a resource guide that anyone can refer to regardless of the website builder they use?
    a. Do you think a mix of these options would work better than just one?

Appendix E: Co-Design Testing Session One Script

Thank you for taking the time to participate in the session today. How have you been doing since we last met? [discussion based on response].

Before we get started, I would like to confirm that I have your permission to record this session today. [wait for response]. Excellent, I will begin recording. A Zoom pop up will appear letting you know that recording has started and will ask for you to confirm continuing the call. Please let me know when you have accepted, and the prompt goes away. [wait for response].

To begin, I will provide an overview of what we will be doing today. For this session, I will be gathering your thoughts on 4 different prototype interfaces that have been developed based on your feedback from the previous session. Each prototype will represent a short content development scenario like adding an image to your website, formatting text over an image, formatting blog text, and editing product forms. This session's goal is to get an understanding of if accessibility integrations into common website building interfaces will be helpful for people to learn about accessible design during their development process.

This activity will be a think-a-loud. This means, while interacting with these prototypes I will ask that you talk through your thought process with every interaction. If you run into something that you find confusing, something that you like, or something you wish was different, please say your thoughts aloud as you continue through your interactions. The focus of these prototypes is not the visual design of the elements, but the interaction flow and the language used around the accessibility elements. Comments should be concentrated toward if the content makes sense, if the interaction flow is user-friendly, or if there is anything that is causing a hindrance to your understanding or ability to finish the task.

Each interface will show the accessibility errors, definitions, and fixes in slightly different formats to see which style you prefer. The prototypes have guided interactions, meaning you will only be able to click on certain elements at a time. If you are ever unsure of where to click, clicking anywhere on the screen will show blue highlights around the interactive elements.

After each prototype interaction I will ask you questions about what your thoughts were on different aspects of the prototype before we move on. At the end, there will be time for you to provide overall feedback or ask any remaining questions.

At any point in this session you may stop to ask questions, ask for a break, or choose to end your participation in the study. Do you have any questions before we begin? [move forward based on response].

To get you used to the think-aloud process, I am first going to ask you to open the link that I just posted in the chat. This will take you to a website called user in your face that is deliberately designed to have a negative user experience. As you interact with the website, I will ask you to narrate what you are thinking during each interaction, thinking about things like this is not easy to use, I wish this was designed a different way, or I find this frustrating. I'm just going to have you take two minutes to do this or you can ask to stop if it becomes too frustrating, don't worry, the actual prototypes will not be this bad.

https://userinyerface.com/game.html

Now that you are in the mindset of critical thinking while interacting with an interface, I am going to have you open the next link that I posted in the chat. This link will take you to the first interface.

Image Upload Prototype

https://www.figma.com/proto/h3zw0Yk5RDeAkNsSsAFsh6/MRP---Prototype-1?node-id=2%3A9&scaling=contain&page-id=0%3A1&starting-point-node-id=2%3A9

- How easy to understand were the pop-up descriptions of the alternative text and decorative image fields?
- Would these descriptions benefit from more, less, or different text?
- Do you think the definitions would benefit from examples of alternative text with corresponding images or decorative images in context or were the text descriptions enough?
- If you were going through this process in a real-world situation, would you check the (?) Button or find the information some other way?

- Does the error message clearly explain what actions need to be taken to resolve the problem or would you prefer more information?
- In a real-world situation, how likely would you be to just click the decorative image option for every image if you were in a rush or unsure of how to write alt text?

Banner Image Text Prototype

https://www.figma.com/proto/h3zw0Yk5RDeAkNsSsAFsh6/MRP---Prototype-1?node-id=2%3A22&scaling=contain&page-id=2%3A2&starting-point-node-id=2%3A22

- Were the image examples helpful to understanding the three options to resolve the problem?
- Is there any other format you would prefer these examples to be in?
- Does the error icon with the box make it clear enough what is causing the error?
- If no, what would you suggest to change or add?
- Do you like having the filtered options for resolving the problem or would you prefer to have more options?
- Are there any other suggestions you have that would make this interaction more clear?

Text Only Formatting Prototype

https://www.figma.com/proto/h3zw0Yk5RDeAkNsSsAFsh6/MRP---Prototype-1?node-id=20%3A47&scaling=contain&page-id=2%3A3&starting-point-node-id=20%3A47

- Was the information provided enough to clearly explain the recommendations around character limits and how to alter your layout to accommodate them?
- Do you think having some sort of character counter integrated with the interface would be helpful or distracting?
- Was the information provided enough to clearly explain what semantic headings are and the rules around how to apply them?

- Do you think having a column on the side of the page that showed the semantic markup of each paragraph and title be helpful or distracting?
- If you experience this scenario in the real world, do you think you would need to do further reading outside of the interface prompts to properly understand what caused the errors and how to fix them?

ECommerce Product Prototype

https://www.figma.com/proto/h3zw0Yk5RDeAkNsSsAFsh6/MRP---Prototype-1?node-id=39%3A464&scaling=contain&page-id=2%3A4&starting-point-node-id=39%3A464

- Now that you have gone through every prototype, which interface did you find more intuitive, clicking through the errors individually or having them all grouped in one side panel?
- I know that the prototype resolved the form issues for you, but do you think you would have understood how to make the recommended updates based just on the text provided?
- Do you think having both the error list and the error icons is helpful or were the icons distracting?
- Would you prefer a checker that is always active and will give you a warning when any new content is not accessible?

Thank you so much for taking the time to meet with me today and share your experiences. Just as a reminder, by participating today you may take advantage of up to 60 minutes of an accessibility review session with myself on one of your websites or other web content that you may have. To make use of this just send me an email with the web content that you would like reviewed and we can either set up a meeting to go through the content together, or I can create a document with comments on the content and suggested updates. In the email please specify which format you would prefer. If you choose to participate in the upcoming user testing sessions, you will be allotted another 30 minutes for the session.

Do you have any questions about today’s session or upcoming sessions or anything else about the study before we conclude?

Appendix F: Co-Design Testing Session Two Agenda

This session was conducted asynchronously a month after the first Testing Session. Through a Microsoft Form, the researcher asked a few questions to see how much the participants remember about accessible web design from the first session, if they have applied this knowledge to any web content they have created recently, and if they have shared any of the knowledge they learned with others. These questions are to see how effective a product like this is at helping people learn about accessibility guidelines in a way that they can remember them at a later date, if they can take the knowledge they learned and apply them when not using an interface built to promote accessibility, and if they share their knowledge of accessibility guidelines with others to help spread awareness of accessibility.

Knowledge Retention & Sharing Questions

- What accessibility guidelines do recall learning about in prototype session one? Please list any that you can remember. If you don't remember the proper name for the guideline please describe it.
- Were any of the guidelines listed above new to you? If yes, please list which ones.
- Since the beginning of this study, have you applied any of the guidelines discussed to other web content you have worked on? If yes, please describe. If no, please explain why.
- Since the beginning of this study, have you told others about what you have learned about accessibility guidelines? If yes, what was the person’s reaction?

After answering the questions, the participants were asked to open the prototype guide to review the final prototype and provide their feedback. A list of prompt questions were provided for them to answer with the option to add any further thoughts.

Prototype Questions

Accessibility Panel

- Do you think a constantly updating side panel is the best way to present the accessibility warnings and information? Please explain your reasoning.

- Do you think the side panel will be an efficient way to help people be aware of accessibility throughout their entire web development process?
- Do you think the explanations for the accessibility warnings are detailed enough without being wordy or overwhelming.
    - Not enough detail
    - Too wordy/too much text at one
    - Just right
    - Other – please describe
- Do you think the examples provided in the descriptions are enough to help make the guidelines clear or do you think there needs to be multiple examples for each guideline?
    - There are not enough examples
    - There are just enough examples
    - There are too many examples
    - There should be more examples only for the more complicated guidelines
    - Other – please describe

Accessibility Features

- How clear is the distinction between Alternative Text and Decorative Images and how to use them compared to the previous prototype?
    - More clear
    - Less clear
    - More clear but could still be better
    - Other – please describe
- How effective do you feel the semantic heading descriptions and errors are in explaining how to use them correctly? Is there anything you would change?
- Do you think separating the heading tags from the text styling will be more user friendly than the traditional presets of one text style per heading? Would this

prototype benefit from having the option to save certain text styles to a heading level?

- Is the colour contrast ratio clear enough as it is or does it need further description?
    - Clear enough as it is
    - It would benefit from a longer description
    - Other – please describe
- Do you think the colour blindness contrast checker is useful in helping people understand how different people may see their colour palette or is this unnecessary? Is there anything you would change?
- Do you think the additional options for the banner styling are helpful in creating a more customized experience?
    - Yes
    - No
    - Other – please describe
- Do you think the carousel format for the hero banner options is more user friendly than the previous iteration?
    - Yes
    - No
    - Other – please describe
- Do you feel that the form field information and warnings are enough to explain why the titles and labels are important? Do you think there needs to be more options?

Prototype Overall

- Do you believe someone with little to no knowledge of web content accessibility guidelines could use this prototype to thoroughly understand how to create accessible web content?

- Do you think that someone with more experience building websites or someone who has accessibility knowledge will find these integrations helpful or a hinderance? If a hinderance, how would you suggest making this more user friendly for everyone?
- Which publishing option do you think will be more helpful to getting people on board with creating accessible web content? Please explain your reasoning.
- Do you think people would abuse the ability to publish a website with errors or will the reminder system be effective in stopping this? Please explain your reasoning.
- Is there anything you would change, add to, or take away from this prototype?

Overview Document

- Do you think that an existing Content Management System could use this Prototype Overview Document to integrate these accessibility features into their own platform? Would they require any other information or documentations?
- Do you think the Overview Document is written in a way that anyone outside of this study can understand what the prototype is and how it would be used? Is there anything you would change?
- Do you think the language used in this document is plain enough that anyone will be able to understand it? Are there any areas that are too technical or not technical enough?

Final Thoughts

- Is there anything else you would like to say about this prototype or the overview document?
- How was your experience participating in this study?

Appendix G: Accompanying Digital Materials

MRP Overview Video – May 6, 2022

Since 1999, Web Content Accessibility Guidelines have set the standard to create accessible websites that anyone can access regardless of their ability. However, as of 2020, less than 10% of websites meet these accessibility standards. This overview video describes how my research uncovered what might be causing part of this problem and how my CMS prototype that integrates accessibility guidelines within the website development process can empower mainstream audiences to build accessible websites.

MRP Overview Video - The Inaccessibility of Accessible Web Design

Youtube Video Link

The Inaccessibility of Accessible Web Design: The Prototype – May 6, 2022

This guide outlines the purpose of the prototype with detailed explanations of each feature. The guide breaks down all of the accessibility integrations of the CMS interface with visual examples for each element.

Typert-Morrison_Chloe_2022_MDes_INCD_PrototypeOverview.pdf

PDF

Glossary

Accessible Content

Any content that meets content accessibility guidelines. However, meeting these guidelines is the minimum requirement and does not always a guarantee that the content is accessible without manual review.

Accessibility for Ontarians with Disabilities Act (AODA)

A statue enacted in Ontario, Canada in 2005 to improve accessibility standards for Ontarians with physical and mental disabilities by 2025.

Accessibility Checker

Software that can check a website's code against web content accessibility guidelines to identify content that may create accessibility issues.

Accessibility Overlay Tool

An accessibility overlay tool is a piece of code that you can add to a website that claims to detect and fix web accessibility issues without needing to update the website itself. People see this tool on the website as a small window where they can most commonly change colour contrast, font, and magnification of objects.

Overlay Example:

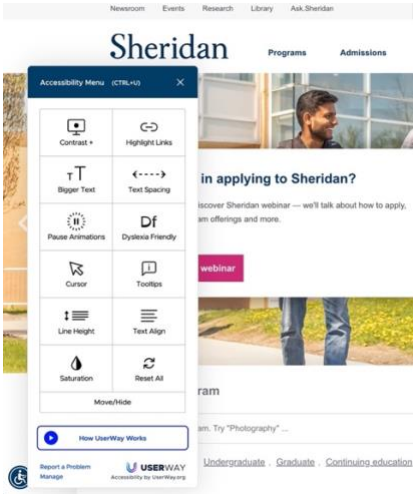

Figure 20: Accessibility Overlay Example

Accessibility Standards

Accessibility standards are laws that government, businesses, non-profits and public sector organizations must follow to become more accessible.

Alternative Text

Also called alt tags and alt descriptions, alt text is the written copy that appears in place of an image on a webpage if the image fails to load on a user's screen. This text helps screen-reading tools describe images to visually impaired readers and allows search engines to better crawl and rank your website.

Advocacy

The act of publicly supporting, defending, or acting on the behalf of a particular group, cause or policy.

Co-Design

A form of participatory design where the identified stakeholder(s) are actively involved in the design process to help ensure the result meets their needs and is usable.

Colour Contrast

The contrast ratio between the text colour and the background colour or image to ensure the information is readable. WCAG 2.0 level AA requires a contrast ratio of at least 4.5:1 for normal text and 3:1 for large text. WCAG 2.1 requires a contrast ratio of at least 3:1 for graphics and user interface components.

Content Creators

People who create any kind of digital content or media. This can include social media posts, blogs, videos, and websites.

Content Management System (CMS)

A content management system is software that helps someone create, manage, and modify content on a website without needing to know how to code.

Example WordPress Interface:

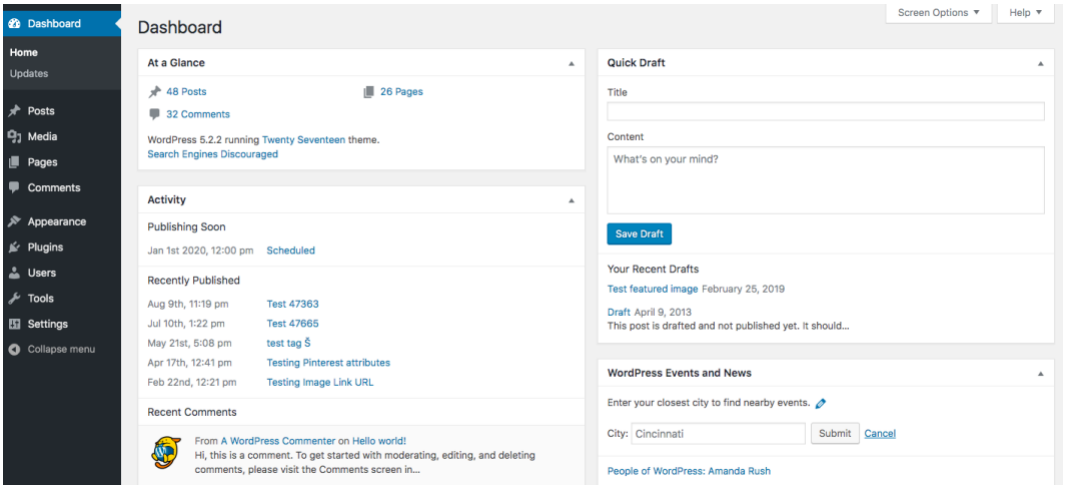

Figure 21: WordPress Dashboard

Decorative Image

Images that do not add any additional information or context to the content on the web page. Marking an image as decorative instead of adding alt text to every image helps screen readers skip unnecessary content.

Demographic

A population grouping based on factors such as age, race, location, abilities, or interests. Demographics can cover from small groups to whole societies.

Disability

The definition of disability is subjective and based on someone's perception of disability. The term disability is constantly evolving and covers a broad range of conditions. A disability can be born with, developed, or be caused by an accident. These conditions can be physical, cognitive, developmental, or mental and can interfere with or limit a person's ability to perform or participate in certain tasks or actions.

Hypothesis

A testable statement, idea or proposed explanation based on limited evidence as a starting point for further research.

Inclusive

Something that does not leave any person or group out, especially those who have been historically excluded.

Jargon

Terminology associated with a particular field or study. These specialized words or expressions may not be understood outside of the context.

Mixed-Methods

Mixed methods research combines quantitative research and qualitative to answer a research question.

Onus

Something that is a person’s duty or responsibility.

Participant-led

This collaborative research treats the participants as equally knowledgeable or more knowledgeable than the researcher on topic at hand.

Peer-reviewed Article

An article that has had its quality assessed by other academics with knowledge in the same field.

Plain Language

Writing designed to be clear and help the reader understand the information as quickly, easily, and completely as possible. Plain language avoids jargon, figures of speech, or other potentially inaccessible terms.

Qualitative Data

This is data related to qualities or characteristics rather than statistics. It is collected using questionnaires, interviews, or observation, and frequently appears in narrative form.

Quantitative Data

This is data related to quantify problems like “what” or “how many”. It is data that can either be counted or compared on a numeric scale.

Semantic Heading

Headings used to describe the content after it. These headings are typically ranked from 1 being the most important to 6 being the least important. Headings must follow logical order without skipping a number.

Smart Technology

An advanced form of technology that uses artificial intelligence or machine learning to add to make devices act like computers.

Social Model

The social model sees disability as “a socially created problem” where disability is not a trait of individuals but something society creates through inaccessible designs. This model removes the onus of finding accessible workarounds from the people who experience the created disability and places it onto the person making the product, experience or environment.

Stakeholder

An individual or group of people with an interest, investment, or concern in something. This can also include people who are positively or negatively affected by something.

Template

In the context of websites, templates are pre-designed website structures or layouts that a person can adapt with their own content or styling.

Think-Aloud

Think-alouds are a strategy where someone verbally narrates their actions, thoughts, and feelings as they occur.

User Testing

A technique where a website, app, physical product, service or event are tested by people who the item was created for. This test is to see how well the product meets their needs and if anything does not create a good experience for them.

Web Contact Accessibility Guidelines

A set of guidelines developed by W3C to be an international standard for web content accessibility. The guidelines explain how to make web content more accessible to people with disabilities.