Usability Study on Wavefront Centre's Website
for Communication Accessibility

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INTRODUCTION

Wavefront Centre for Communication Accessibility is a non-profit organization based in B.C, that exists to reduce hearing-related communication barriers by providing access and inclusion for the Deaf and Hard of Hearing. We are conducting a usability evaluation on Wavefront's website because we are interested in researching their main touchpoint for new and returning visitors. Our goal is to identify how we might improve the website to accommodate both user groups while taking account of their various pain points and frustrations with this online medium. We want to see how usable and satisfying the website is in terms of relaying information to its users. This is especially important now during the global pandemic, when online accessibility needs to be optimal in order to communicate effectively.

STUDY METHODS

Participants: Through the help of our company champion, as well as word-of-mouth and posting on Facebook, we recruited twelve participants (six Wavefront staff members, referred to as Group A, and six visitors, referred to as Group B).

Through our meetings with our company champion, we decided to include Wavefront staff members because they are more familiar with the content and have experience with using the website. The frequent users helped us understand the motivating factors behind website usage, such as helping clients with product information. The age range of this group was 30-59.

Group B participants were screened such that they had to have experience with helping someone who is deaf, hard of hearing, or faced some other communication challenges (such as needing a translator). We included these participants to get data on individuals who are likely to not have visited Wavefront before, but may need their services in the future. All six Group B participants had not visited the Wavefront website prior to participating in our study, thus, these users gave us insight into how a novice user navigates the site for the first time. The age range of this group was 18-39.

Heuristic Evaluation: A Heuristic Evaluation (HE) was conducted by the evaluation team, focusing on the Hearing Clinic section and the Shop (e-commerce) section, as they are heavily trafficked areas of the website. To maximize efficiency and error findings, the evaluators split up into teams of two, with each team evaluating only one section. Afterwards, the teams shared their findings with each other and came to a consensus on the most severe and common HE actions. Tasks were created for the HE based off of conversations with our company champion, after asking what they thought a typical user might visit the website for. The evaluation was conducted using Jakob Neilsen's 10 usability heuristics for user interface design, and a severity rating was allotted to each broken heuristic (0-not a problem, 1-irritating, 2-minor, 3-major, 4- can't complete a task). The HE aims to determine whether an interface complies with design principles for a seamless experience. This matched the goal of the study as any identified interruptions in Wavefront's interface would be probable pain points and frustrations for users.

Think-aloud: We used the Think Aloud (TA) method in order to get qualitative, affective data. Participants were encouraged to narrate their thoughts out loud as they navigated the website. This was done to help the evaluators understand the users' cognitive thinking for both participant groups as they completed the given tasks.

Open-ended interview: After participants finished the tasks, we conducted a structured interview to probe further into their user experience. We used this qualitative data to give context to the quantitative data we received through the post-test questionnaires. We chose a structured interview to maintain consistency for the questions asked between the two participant groups. This allowed us to easily analyze the answers and compare them for the similarities or differences.

Tasks: The HE was done first by the team of evaluators to help create tasks for the participants. The tasks of the HE and TA were created such that they shared the same user end goals. This was done to maintain consistency between the two evaluation methods. Common tasks, such as booking a hearing test appointment or buying a product were chosen for both participant groups. A total of four tasks per participant were decided on to ensure participant fatigue did not occur while making sure the most common actions were covered. Refer to figure 1.1 for more details. A pilot study was conducted between the evaluators to ensure the feasibility of the tasks.

Group A Tasks	Group B Tasks
Shop: A customer calls in and says "Hi, I'm looking for an alarm clock that is less than $100. The alarm clock should have a snooze button." *Find an alarm clock for the customer that matches this description.*	Shop:You are looking for an alarm clock that is less than $100. The alarm clock should have a snooze button. *Find an alarm clock that matches this description.*
Shop: A customer calls in and says that they were recommended a product from a friend and are interested in learning about the Pocketalker Ultra Amplifier. *List 3 features of the product.*	Shop: *List 3 features of the Pocketalker Ultra Amplifier.*
Hearing Clinic: A customer who has booked an appointment calls in and asks about the pricing and what to expect during the visit. *Where would you direct them?*	Hearing Clinic: You've just booked an appointment for a hearing test for someone, but you've forgotten about the pricing and what to tell them to expect during the visit. *Find out: How long is the initial hearing test? How much does it cost? And any perks if the person would benefit from hearing aids.*
Hearing Clinic: A customer calls and wants to purchase a hearing aid, however he's not sure whether it's the right fit for him or how to properly take care of the device. *Which section of the website would you be able to find the most appropriate answer for this question?*	Hearing Clinic: You are trying to purchase a hearing aid for someone on Wavefront's website, however, you are not sure whether it's the right fit for them or how to properly take care of the device. *Which section of the website would you go to and find the information regarding refund/trial processes?*

Figure 1.1. Tasks given to the respective participant groups.

Data Collection: Quantitative data was collected through the participant's post-test questionnaire responses to the System Usability Scale (SUS) questionnaire. The 10 item questionnaire with 5 response options measured the perceived usability of Wavefront's website. Because of how the questionnaire is laid out, it ensures the consistency of the user's responses by including reverse questions in a likert-scale format. The results from the SUS will indicate the overall usability level of the interface of Wavefront website, without indicating specific sections that need improvement. A score within the range of 68 is rated at a C-grade, meaning that the interface is usable, but could be improved. An 80.3 or above is an A-grade, meaning the interface is working well. A score below 51 is a fail, meaning the interface is not usable and needs to be improved.

The pre-test questionnaire results were collected using Google Forms. Each study was conducted with two members from the evaluation team, with one taking the role of facilitator, and the other in charge of note-taking. The qualitative data collected from the open-ended questions were recorded in an Excel spreadsheet. Participants' think-aloud comments were also recorded in the same file.

VALIDITY

External Validity: We selected the two main demographics who currently use the website as their guide to complete various tasks around finding information about services or products related to accessibility issues. The setup was controlled, as all Group A participants were participating from either their office space or their own work-from-home setup during regular work hours. Group B participants completed the tasks from their homes to ensure the most natural and authentic environment. The tasks were specifically chosen to match the real-world usability needs of the website. Our two chosen sections of the website: Shop and Hearing Clinic, are the most frequently visited pages on the website, indicated by the heat map data from HotJar (Figure 1.2).
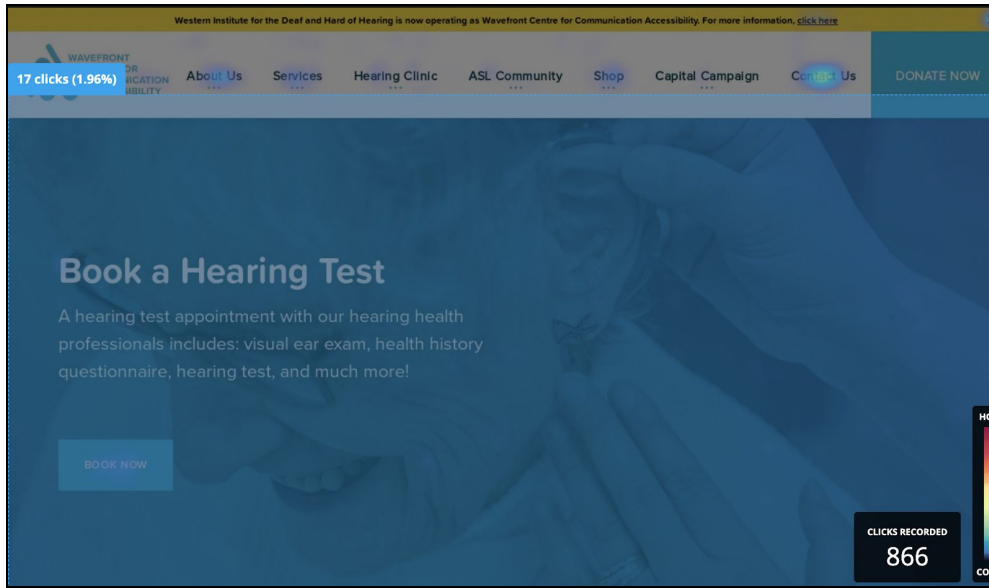
Figure 1.2. Screenshot from HotJar showing hot-spots on the website.

Content Validity: To ensure content validity, we used the 10-question System Usability Scale (SUS), originally created by John Brooke in 1986, to measure the satisfaction of the participants in the post-test questionnaire. For the open-ended question interview during the last stage of our study, we chose 5 questions from Rev's "23 usability test questions you absolutely have to ask" which helped us uncover major pain points and opportunities for further investigation. The evaluators came to a consensus on the questions chosen to be most suitable for the study.

Construct Validity: Since we focused on two very different user groups; staff members, who use the website daily, and website visitors, it was important for us to measure satisfaction instead of efficiency. It would be inaccurate to determine the most optimal number of errors/clicks/steps to get from point A to B because the website's current structure allows users to access the same page in different ways. Additionally, the potential task time is prone to increase due to the think-aloud method, and the knowledge gap of using the website between the two user groups could have also inaccurately skewed the data.

QUESTIONNAIRES

Pre-test questionnaire: We created two different versions of the Google From questionnaire for each participant group to collect both quantitative and qualitative data. Group A's questionnaire allowed us to gauge background information related to working at Wavefront and using the website as a resource for customer help. Group B's questionnaire was more general and provided us with information about users' backgrounds, education levels, and prior experience with helping people with accessibility needs.

Post-test questionnaire: After the completion of the think-aloud study, quantitative data was collected using a Google Form questionnaire with the 10 SUS questions to evaluate the users' satisfaction of using the website to complete the aforementioned tasks.

Data Analysis: To analyze the results of the HE, we focused on the heuristics with the highest occurrence of severe problems and comments to pinpoint areas of the website that need further investigation. A frequency distribution chart was made with the post-test questionnaire results to visualize each participant's results and to determine how severe the problems were with the website's usability. We then compared them to the severity scores of the HE to find common issues (See Appendix 1). Lastly, we analyzed the notes that were taken during the think-aloud study and interview processes to identify the patterns, and drew parallels between our usability methods.

RESULTS

Heuristics: We found that the website layout lacked visual hierarchy, which made it difficult to isolate and find important information. Participant 6 supports this in the think-aloud study where he states that, "there was also a lot of content to digest...but it could be condensed a little bit." There was also a lack of accelerators (e.g. in-text links) and indicators (e.g. no highlighting of which page the user is on) which break heuristic #1, visibility of system status. This was also supported by participant 12, stating that they were "mostly guessing, [and did not] know where [they currently were] on the page, so it's kinda annoying." Participant 8 also expresses that "[he] was just clicking pages, [and didn't] know where [he was], especially when there's so much to click on."

Wavefront's online shop was also prone to many usability errors. Many of the buttons did not lead to the correct page or to a page at all, breaking heuristic #4, consistency and standards, and heuristic #5, error prevention. The evaluators rated this error as a 4, meaning that they could not complete the required tasks. The online shopping cart could not be accessed when viewing products, and could only be accessed when another product was being added to the cart. The lack of visibility on the system's status breaks heuristic #1 with a severity level of 4 from both evaluators. Heuristic #9 is therefore also broken as Wavefront's website does not provide error messages at any point in the process. (e.g., Customers who have uBlock extension installed will be stuck at the checkout loading bar indefinitely). Heuristic #7, flexibility and efficiency of use, is also hindered as the website does not allow navigation to shop subcategories unless one is on the home page. Also, customers do not have the option to search for an item on a search bar. Participant 7 confirms this frustration as she states that the "most frustrating part is that there's no search bar, there's no filters at all, and there's no visuals and it's just text." See Appendix 1. for a detailed breakdown of the correlation between user action and heuristic broken.

Open-ended Interview Results: The results from our open-ended interviews suggest a few common themes, even between the two participant groups. When prompted with the question, "What aspects of the website helped you to complete the tasks?", 10 out of 12 participants said that the top navigation menu bar was the feature that helped them. However, since our audience comes from a lay background, we are unsure if this was a common answer because it was actually useful, or if it was the only common aspect participants knew to reference.

Another common suggestion that came up during the open-ended interview was the implementation of a search bar. Almost all participants mentioned that having the ability to search for keywords or questions would have alleviated a lot of the struggles they faced while trying to complete the tasks.

"I think if there was a Search [function] it would've been much easier. Like that was the first thing I was looking for when I got on this website. Especially after the second task, I definitely would have benefited with having a search function since I was recommended that product." - P6, Group B

System Usability Scale Scoring: After scoring the results from the SUS, we interpreted the data and pinpointed common themes within the answers. 5/6 participants from Group A scored close to 80.3 (A-grade). This shows that Group A sees Wavefront's website enjoyable and is likely to recommend it to a friend. On the other hand, in Group B, only one of the participants scored Wavefront's website above 51(F-grade). The other 5/6 participants scored the interface below 51, which meant that they felt like the usability needs to be fixed (see Figure 1.4.).
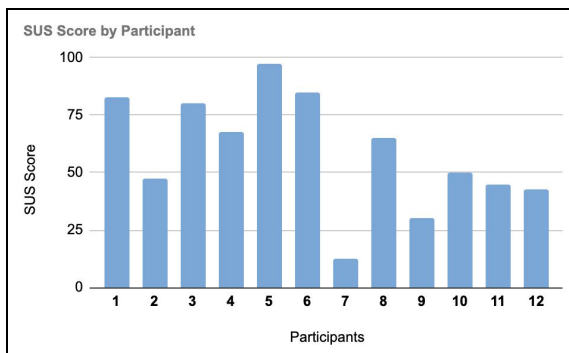

Figure 1.3 SUS score by participants

When Group A was asked if the website was easy to use, all of them agreed or strongly agreed (M=4, SD=0.6). When Group B was asked the same question, all of them were neutral or disagreed (M=2.3, SD=0.5). When Group A was asked if functions in the website were well integrated, more than half of the participants agreed or strongly agreed (M=3.5, SD=1.0). In contrast, Group B answered mostly neutral or disagreed with the statement (M=2.3, SD=0.8). The average SUS score between both Group A and Group B is (M=58.75, SD=25.12), which means the usability of the website is hardly between an "F" and a "C" grade.

DISCUSSION AND CONCLUSION/SUGGESTIONS

From our results, we can imply that improvements need to be made to the website to ensure users' satisfaction. We understand that there may be some bias in our results from Group A as the participants are more familiar with the website and have been using it more frequently than Group B. Group A also had prior knowledge of products and services, so it may have been easier for them to know which section of the website to navigate to in order to complete the given tasks.

Our usability study allowed us to analyze the interface of a real-world client in order to make meaningful contributions to the website's usability and satisfaction for effective ways of communication during a global pandemic.

Based on the results of our research, we have three main recommendations for improving the satisfaction of Wavefront's website. Our first recommendation is for Wavefront to expand on their current COVID-19 FAQ page and include more general information for services such as appointment bookings, trial and refund processes, and product information (Figure 1.5). As suggested by many of our participants from both groups, Wavefront could also implement a search bar to allow users to easily find specific information. This was especially significant in the shop section of the website as there are a lot of products to sort through.
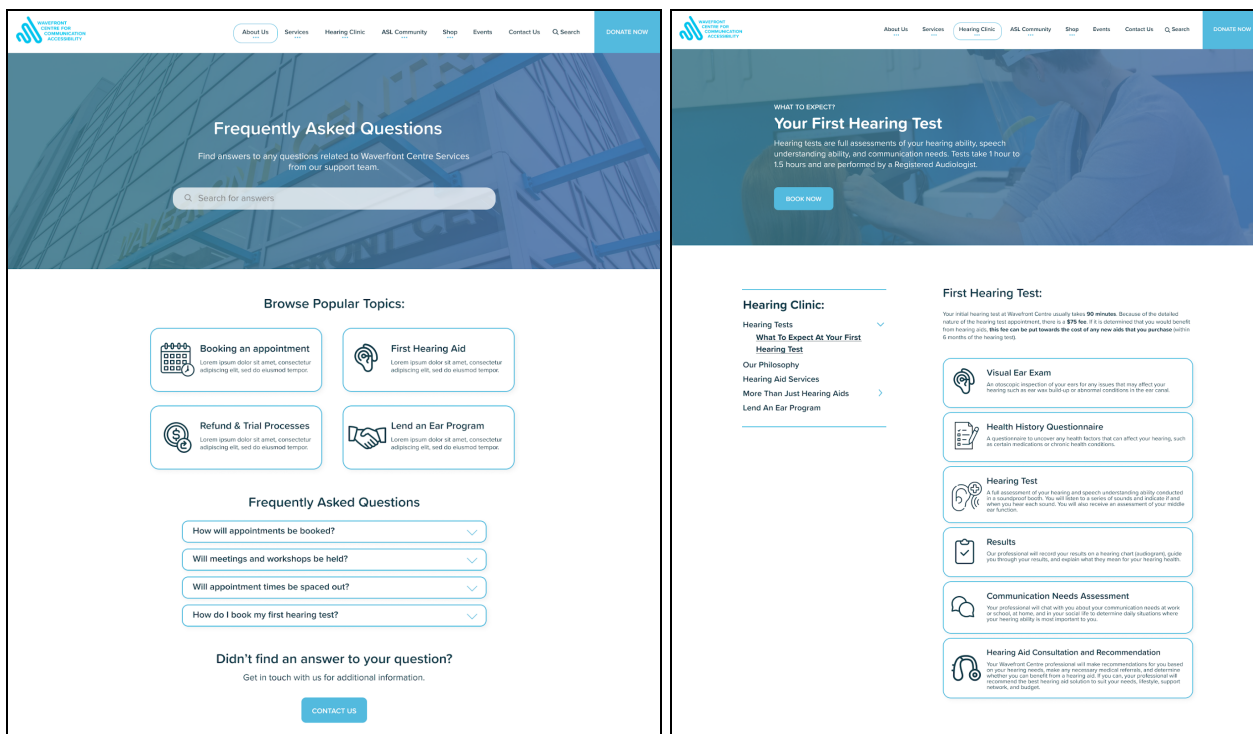

Figure 1.4-1.5. New user interface suggestion mockups.

Lastly, we recommend improving the information architecture of their webpages. By including more visual elements such as icons, infographics, or photos, users would feel less intimidated from seeing such long paragraphs of information (Figure 1.6). As with the FAQ redesign, we also suggest updating the sidebar navigation to clearly show users which section of the website they are on.

Appendix 1

Please see attached files for additional raw data.

Actions	Heuristic Broken	Severity Level
Cannot view cart/checkout unless I add another item to my cart.	#1	4
Some product links take you to the other shop domain	#4	4
Broken and redundant links.	#4, #5	4
ASL is available on all pages except for the "Clinical Research Program".	#4	4
Checkout loading becomes endless unless you remove the Ublock/Adblock extension, but there is no popup dialog to inform you to do so.	#9	3
No indication for which page one is currently on.	#1	3
Users cannot search for a specific item on a search bar.	#7	3
On sale items do not show how much it was discounted	#4	2
Users cannot navigate to different subcategories of devices. e.g, alarm clocks, hearing aid batteries, etc without going back to the shop homepage	#7	2
ASL videos recommend other videos when over.	#4	2
Inconsistent font sizes between different pages.	#8	1
Collapsed menu navigation glitches when resizing the browser.	#8	1

Figure 2.1. Detailed breakdown of correlation between action and heuristic broken.
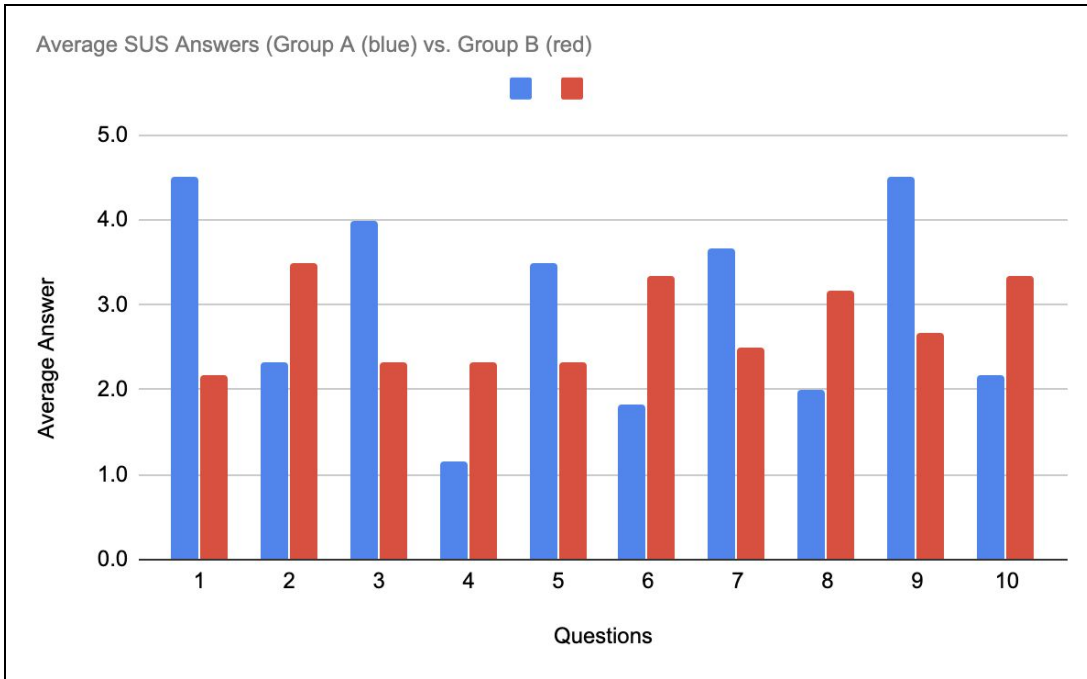
Figure 2.2. Average SUS answers per question between Group A (blue) and Group B (red).
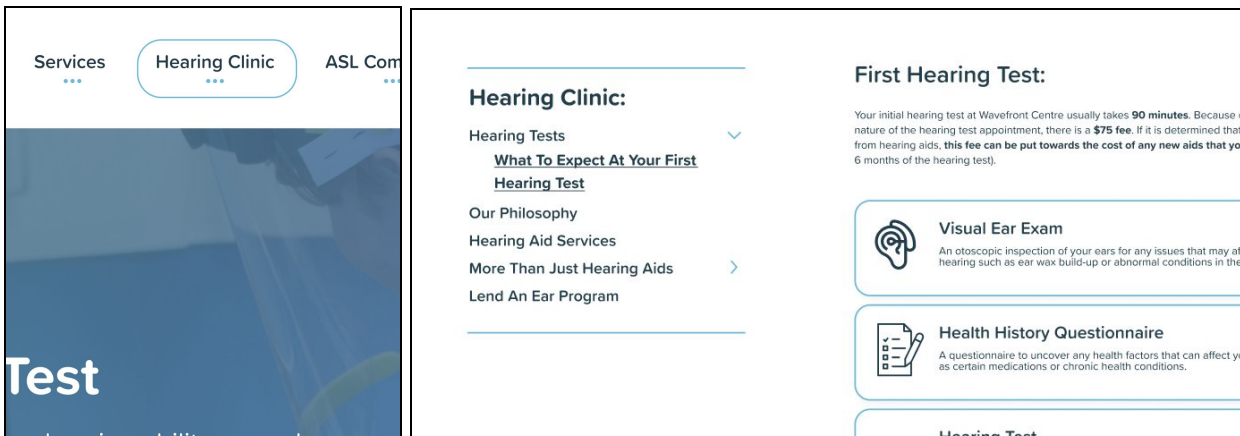

Figure 2.3. [Mockup] Blue outline or arrow for feedback on which page the user is currently on. Left: Navigation bar. Right: Content pages. Addresses Heuristic #1, visibility of system status and Heuristic #4, consistency and standards.
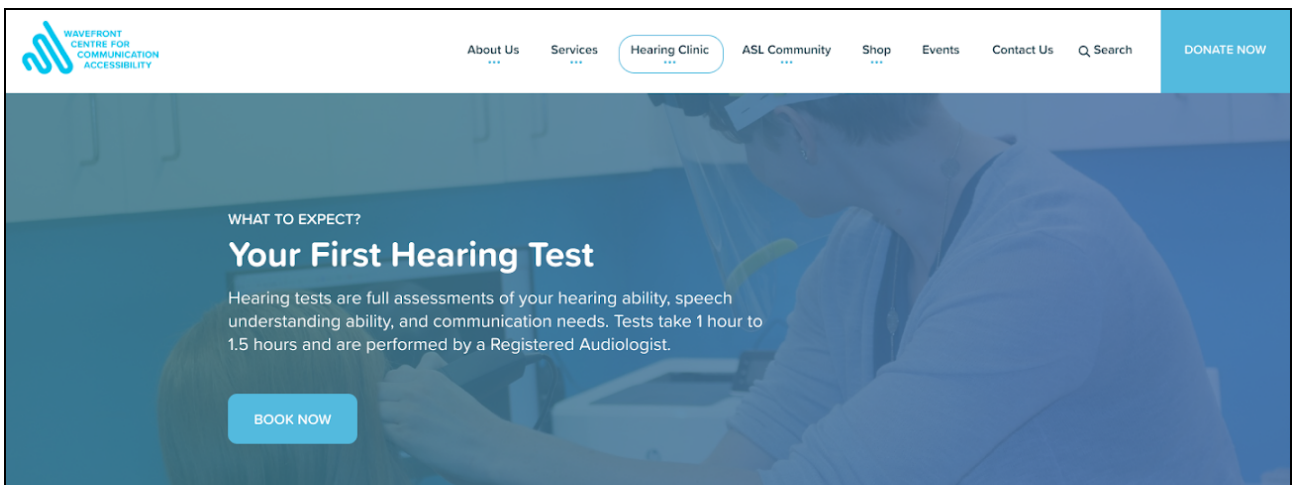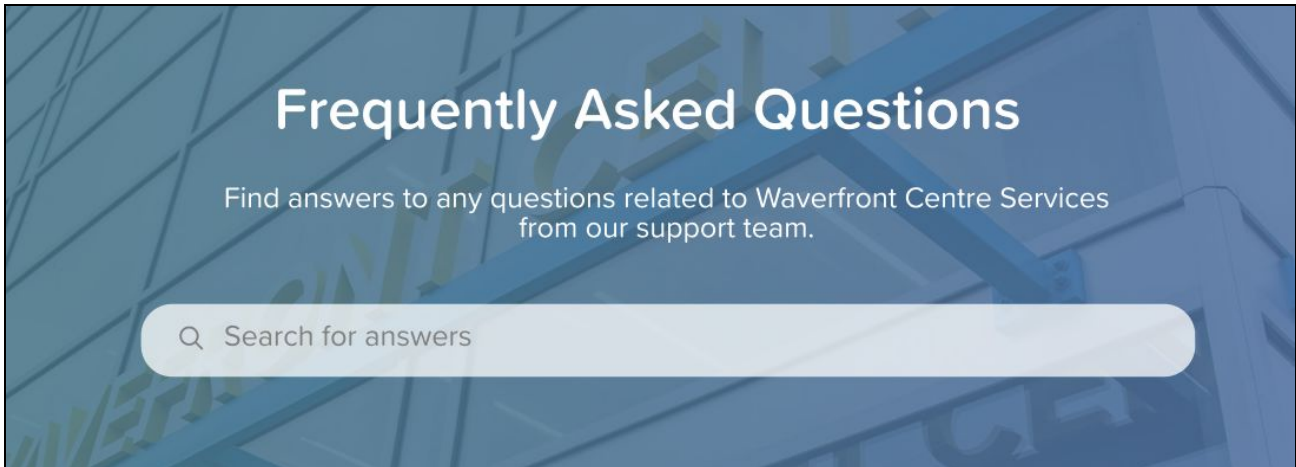
Figure 2.4. & 2.5. [Mockup] A search bar in the FAQ, and sitewide in the top navigation helps users find information easier. A search bar acts as an accelerator to create a more efficient and seamless experience. Addresses Heuristic #7, flexibility and efficiency of use.

Figure 2.6. [Mockup] Visual cues to differentiate hierarchy and quick processing. Addresses Heuristic #8, aesthetic and minimalist design and Heuristic #7, flexibility and efficiency of use.

Appendix 2

Please see attached files for the filled out questionnaire forms.

Pretest questionnaire for Group A: https://forms.gle/JAuKXuykx1WPCeKc6

Pretest questionnaire for Group B: https://forms.gle/VVLkvE163yGgt4R1A

Post-test questionnaire: https://forms.gle/D5x9f2c957U9ipmi9

Citations

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    the-usability-of-your-website/