

**The Open Virtual Usability Lab:
A New Tool for Research on Learning Technologies**

Accessibility evaluation and pilot testing of the tool

by

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Abstract

The Open Virtual Usability Lab (OpenVULab) is an open source tool with many applications for research on learning technologies. Recent development of the tool has been directed towards enhancing its accessibility. This study was conducted in an effort to evaluate the accessibility of the participant interface of the tool, and to carry out a pilot test of one of the applications of tool, namely, to evaluate website accessibility. University students with learning disabilities were recruited for the study. The student participants found OpenVULab easy to use, and highly valued the page display customization widget. Accessibility testing of the OpenVULab participant pages and selected university websites with the students revealed the value of conducting subjective accessibility testing (i.e., with potential users of the tool or website) to complement the results of objective accessibility testing with automated tools such as AChecker. Both automated tools and student participants identified potential accessibility issues, but the issues identified were different. Future OpenVULab development efforts will be directed towards incorporating student suggestions for enhancing the participant interface related to the layout and options associated with the page display customization widget, and responding to possible accessibility violations related to compatibility with assistive technology as revealed by AChecker reports and field testing with Kurzweil 3000 on student laptops.

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I. Background

The Open Virtual Usability Lab (OpenVULab) is an open source screen and audio recording tool with many applications for educational research. For example, OpenVULab may be used to collect data from students as they interact with learning technologies such as course websites or digital library catalogues. As a result, this tool supports research into understanding how students interact with learning technologies as well as how usable and accessible the technologies are. Given the increased prominence of technology use in education, as well as legislation that mandates accessible implementation of e-learning in many jurisdictions (e.g., the Integrated Accessibility Standards of the Accessibility for Ontarians with Disabilities Act, the AODA, in Ontario), OpenVULab is a tool that is highly relevant to educational research today.

OpenVULab collects data from participants before, during, and after they engage with learning technologies without any researcher intervention. At the onset of a testing session, users log into OpenVULab, are presented with a task to accomplish (e.g., to visit a website), and an online questionnaire designed by the researcher pops up. The pre-session questionnaire could be used to query users' demographic information, personal characteristics, or previous computer experience, for example. Then they are re-directed to the website and a recording of all their on-screen interactions begins. After they conclude the task, a post-session pop-up questionnaire designed by the researcher elicits users' perceptions about their experience, problems encountered, suggestions for improving the website design, or other relevant questions. OpenVULab creates on its server a digital video recording of all onscreen interactions. If a microphone is connected to the computer, users' verbalizations are also recorded and synchronized with the video. Lastly, the researcher exports the video and questionnaire files from the OpenVULab server for subsequent analysis using a video coding tool.

Several attributes of OpenVULab set it apart from other screen recording tools. First, OpenVULab does not require users to install software on their computer. This is a significant advantage as it allows researchers to deploy OpenVULab in campus computer labs where computers are often locked down by network administrators so that software cannot be installed. Secondly, students may work from their own computer when participating in a study and may thus make use of their preferred web browser configurations. A third advantage is that OpenVULab data are stored on a central server which leads to greater security and privacy protection. Fourthly, OpenVULab is the only open source tool of its kind—all the others are commercial products. This means that not only can other researchers use the tool at no cost, they can modify it to suit their purposes.

A beta version of the OpenVULab was used to test the ease-of-use of a Web-based game played by 42 students in a university lab setting (Wideman et al., 2007). The study demonstrated that OpenVULab can operate unobtrusively as students engaged in game play. While students did not mention encountering any play problems when asked about play difficulties on the response forms presented at the end of the game play period, and made no suggestions for improvements, analysis of the screen and audio recordings revealed that they had encountered several operational difficulties in the initial stages of game use. This study also demonstrated the value of OpenVULab for documenting unintended or unanticipated processes and outcomes as students engage in e-learning.

The most recent OpenVULab development efforts have been directed towards enhancing accessibility of the tool, so that it may be used by researchers and participants with a wide range of abilities and in a variety of contexts. For example, given the suitability of the tool for conducting research into accessibility of learning technologies, it is important that the tool itself is accessible so that it may be used by researchers and/or participants with disabilities. To this end, a Fluid Infusion widget (<http://fluidproject.org/products/infusion/>) has been integrated into each screen of OpenVULab (as shown in Figure 1 below) to allow users to customize the on-screen display.

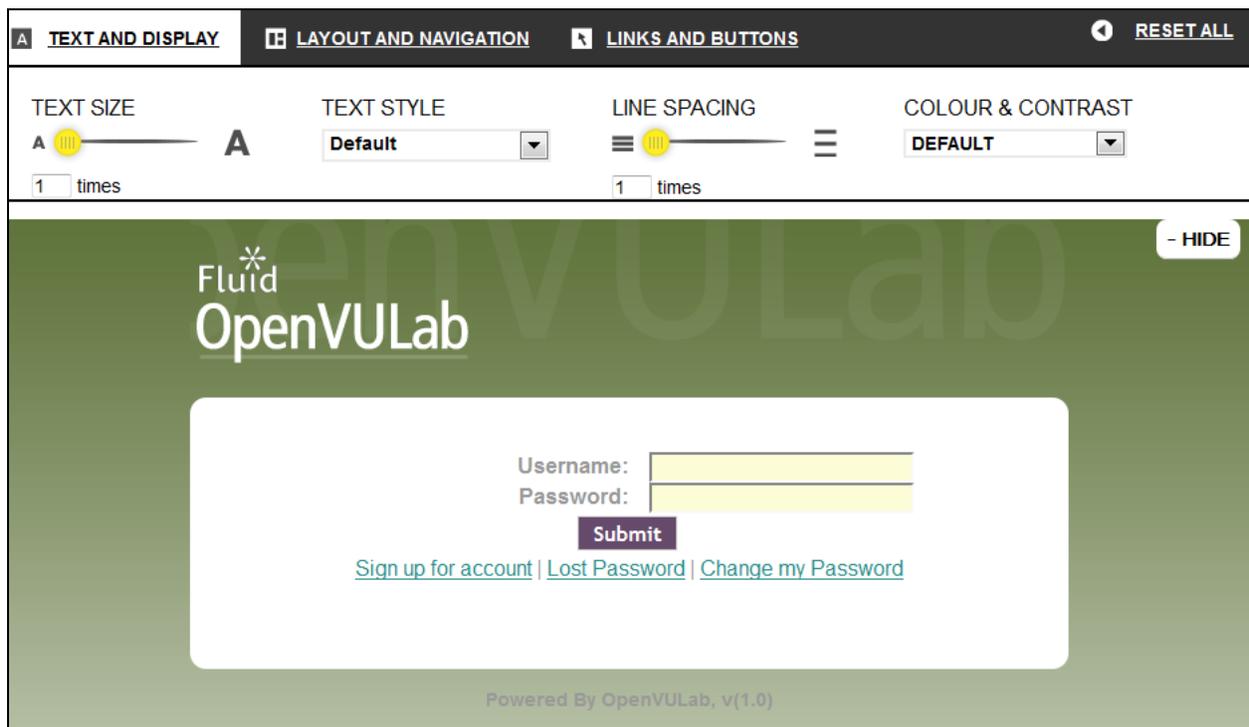


Figure 1. The OpenVULab login page, illustrating the open customization menu along the top.

Research objectives

The research objectives of this study were twofold. Firstly, this study was designed to evaluate the accessibility of the OpenVULab participant interface. This was approached by conducting objective accessibility testing of the relevant screens using automated tools and by conducting subjective accessibility testing wherein the participant interface is used by university students. Secondly, the use of OpenVULab in this study represents a pilot test of the ability of the tool to facilitate subjective accessibility testing of websites. Moreover, this study allowed for a comparison of the data obtained from subjective accessibility testing with end users to that obtained from objective testing using automated tools in the absence of users.

II. Methodology

Participant recruitment

We recruited students with disabilities to work with OpenVULab in order to capture feedback from a group of participants who may be expected to exhibit a wide range of needs and preferences with respect to computer use. Recruitment emails were sent to students with disabilities through the university listservs of the learning disabilities; and physical, sensory, and medical disabilities divisions of Counselling and Disability Services of York University. A gift certificate for the university campus bookstore was offered to participants as compensation for their time. Due to the possibility that some of the student participants may consider themselves to be print-disabled and thus have difficulty reading a printed document (Coombs, 2010), the informed consent form was emailed to students in advance of the testing session to allow them to use assistive software to preview the forms in electronic format if desired.

We aimed to recruit approximately five students to participate in this study. This was based on Nielsen's assertion that four to five users are likely to find the majority of usability problems when conducting usability testing (Nielsen, 1993), and the relationship between usability and accessibility. Namely, that accessibility testing may be considered to be an extension of usability testing that is aimed at identifying if software is usable by a wide range of users (Henry, 2007).

Subjective accessibility testing sessions

An office workstation (a cubicle with privacy panels) equipped with a desktop computer with attached external gooseneck microphone and mouse was used as the testing laboratory. Two researchers were present with each student during testing sessions. During sessions of

approximately 30 min, students were asked to sign up for an OpenVULab account at the OpenVULab homepage, set page display preferences using the customization widget, log in to OpenVULab and complete an assigned project, and discuss their experience with the program and websites during an exit interview. Following this, students who had brought personal laptop computers with the text-to-speech software Kurzweil 3000 installed were asked to use the “Read the web” feature of the program to test the OpenVULab pages for screen reader compatibility.

The OpenVULab project included a pre-test survey, a short task to complete while navigating through websites (stated as “Your task is to locate the hours of the York University Bookstore” and initiated from the York University homepage), and a post-test survey. While navigating through the university websites, the on-screen interactions and verbalizations of the students were recorded, and students were asked to use the think aloud protocol (Ericsson & Simon, 1993) to verbalize their thoughts. Refer to Appendix A, B, and C for the pre-test survey questions, post-test survey questions, and exit interview protocol, respectively.

Initial exploration of OpenVULab (including signing up for an account, setting page display preferences, logging in to OpenVULab, and accessing the testing project) were completed with coaching from the researchers. The testing project itself (including surveys and a university website exploration task) was completed by the students without coaching from the researchers, with the exception of reminding students of the website exploration task when necessary.

Objective accessibility testing

OpenVULab screens and university websites that all students accessed were analyzed for accessibility using automated tools. AChecker (<http://achecker.ca/>) was used to evaluate the screens/websites for conformance to the Web Content Accessibility Guidelines (WCAG) 2.0 Level AA (the required conformance level as stipulated by the AODA and commonly appearing in legislation in other jurisdictions). The Firefox add-on Fangs (<https://addons.mozilla.org/en-us/firefox/addon/fangs-screen-reader-emulator/>), a screen reader emulator, was also used to understand how selected pages would be translated from text to speech.

III. Results

Student participant profiles

Seven student participants were recruited for this study, as described in Table 1.

Table 1

Self-Reported Participant Characteristics

Participant^a	Disability^b	Common difficulties encountered while using the computer
Nora	L	using library search tools and navigating on pages with a lot of information; small fonts on websites
Breanne	L and M	locating information on websites
Hilde	L	spelling without a spell checker program
Sara	L	reading large chunks of text, especially on the Internet
Julie	L	text-to-speech software does not work with all electronic articles or websites
Chantelle	L	finding information on websites, especially if visiting the website for the first time
Teri	L	working with websites and programs with many buttons and cluttered layouts

^a All students are female undergraduates, and pseudonyms are used in lieu of participant names.

^b LD = learning disability; M = mental health disability

OpenVULab pre-test survey results revealed that all student participants had completed an online survey for other purposes before this study. Additional relevant pre-test survey data are summarized in Table 2.

Table 2

Self-Reported Participant Computer Use and Skills (N = 7)

Question	Mean Rating
How frequently do you work on a computer?	4.9 ^a
How would you describe your overall skills in using the Internet?	4.1 ^b
How would you rate your ability to navigate through websites?	3.4 ^b
How would you rate your ability to find information on websites?	3.1 ^b

^a Scale 1 = very rarely to 5 = very often ^b Scale 1 = very poor to 5 = very good

Accessibility testing of the OpenVULab participant interface

The OpenVULab participant interface includes five key pages: the software login page, the account creation page, the project homepage, survey pages, and the project task introduction page. Refer to Figure 1 and Appendix D for screenshots of these pages, and Table 3 for a summary of accessibility testing results of these pages. When a student laptop with Kurzweil was used to read OpenVULab pages, the screen reader became stuck at the customization widget and the student was unable to advance to other sections of the page. However, this actual problem was not predicted when Fangs was used to predict the screen reader output on OpenVULab pages (data not shown). The cause of the problem may have been due to the setup of the students' computer, which was an older model, or it may be due to problems with the Infusion widget code.

Table 3

Results of accessibility testing of OpenVULab participant pages

Page	Objective Testing with AChecker^a	Subjective Testing with Students^b
Login	No known problems	No problems encountered or specific likes/dislikes discussed
Account creation	2 success criteria violations (2 individual problems): link buttons without alternate text	No problems encountered or specific likes/dislikes discussed
Project homepage	2 success criteria violations (3 individual problems): missing information required for assistive technologies (incorrect header nesting, language not identified, invalid language code)	No problems encountered or specific likes/dislikes discussed
Surveys ^c	5 success criteria violations (112 individual problems): missing information required for assistive technologies (missing labels for inputs such as radio boxes; language not identified), insufficient text to background color contrast	Likes: clean background (good text to background contrast); short and simple questions Dislikes: some question wording was confusing; the size of radio buttons and check boxes are not increased when the enlarge inputs option is selected from the page customization widget; line spacing between answers within individual questions increases too much when text size is increased
Project task intro	2 success criteria violations (2 individual problems): missing information required for assistive technologies (language not identified); link button without alternate text	The project task instructions were less prominent than the agreement to be recorded (some students did not notice the project task instructions)

^a AChecker was used to test for WCAG 2.0 AA compliance, which includes conformance testing against 61 success criteria.

^b None of the students used assistive software when participating in the study.

^c The pre-test survey page was included in this analysis. This survey included yes/no, radio box, check boxes, drop-down menu, and text box question formats.

The customization widget (refer back to Figure 1) is a feature that appears on all OpenVULab pages. Students offered substantial oral feedback about the page display customization widget. The presence of the widget was deemed very helpful overall. Students would, however, prefer a more informative name for the widget as “show display preferences” did not necessarily convey that this is a location where the preferences can be changed. Students liked the ability to change the display preferences on every OpenVULab page including when viewing different regions of the same page, and Sara expressed interest in having the widget available on all webpages that she views (i.e., not just in OpenVULab). However, on some pages the widget was not prominent. For example, when reading survey questions, the widget in the upper right corner was not in the area of the page that the students were focusing on; and the widget disappears from view entirely when scrolling down on a long page such as a page with a lengthy survey.

Table 4 presents the usage of the customization options when students were participating in OpenVULab as compared to self-reported typical use of customization features when browsing websites. Nora commented that she does not typically adjust page display settings because she is not aware of how to do that with her web browser.

Table 4

The use of page display customization options by student participants (N = 7)

Customization Option		Typically Adjusted ^a	Adjusted ^b	Mean Ease of Adjustment ^c
Text & Display	text size	71	71	4.6
	text style	43	100	4.9
	line spacing	14	57	4.4
	color & contrast	0	0	4.7
Layout & Navigation	show Table of Contents	29	57	No data
Links & Buttons	emphasize links	29	57	4.3
	enlarge inputs	14	43	4.4

^a Frequencies are reported as the percentage of students who self-reported typically adjusting this parameter when working on the computer (i.e., typical practices self-reported for outside of this study).

^b Frequencies are reported as the percentage of students who chose to use an adjusted setting for the relevant parameter while working with OpenVULab.

^c Students were asked to try adjusting all parameters while working within OpenVULab; Scale 1 = very difficult to 5 = very easy

Student oral feedback about the individual customization options correlate with the observations in Table 4. In particular:

- The ability to increase text size and change text style was deemed particularly important to the students. According to Breanne, “For text size, I like seeing it big because it’s easier for me to read. If it’s really small then I’m just kind of squinting and all the words get kind of almost mashed together.”
- All of the students selected a customized text style, with 4 of the 7 students choosing Times New Roman as their preferred font. Students were generally satisfied with the font options, though Sara suggested that the addition of Century Schoolbook as an option would also be helpful.
- None of the students reported typically adjusting color contrast and they did not do so while using OpenVULab. While they did not find the available alternate color schemes to be helpful or aesthetically pleasing, some students did acknowledge that the availability of those options may be useful to some students (e.g., students with visual impairments).
- While some students liked the ability to display a table of contents, it was noted that there was insufficient text to background contrast with this feature.
- Some students liked the emphasized links and enlarged inputs, while others found the links and inputs to be too prominent on the page when these options were selected.

In addition to the five primary pages with the customization widget discussed above, participants must also access a link to start and stop the recording process (visible in the top center of the browser) when commencing and concluding the project task. While students did not have any difficulty with starting the screen and audio recording to begin the assigned project task, the link needed to stop the recording disappeared from view during sessions with two of the students. This happened when Hilde concluded the task while having scrolled down to the bottom of a lengthy page, and when Teri clicked on a link that opened a new browser tab.

Overall, students rated their overall experience with using OpenVULab as “good” or “very good.”

Pilot testing of OpenVULab as a web accessibility testing tool

OpenVULab created video recordings of the students’ on-screen interactions synced with their think aloud verbalizations as they completed the project task (locating the hours of the York University Bookstore). Review of the videos allowed us to determine the efficiency of task completion, note sentiment displays (expressions of displeasure), and recognize other interesting trends in the students’ on-screen activities.

The individual students all began with the York University homepage and ended at the York University Bookstore homepage (as shown in Appendix E), though they accessed different websites in between. All students were successful in completing the project task. Six of the seven students completed the task in approximately 30 s, while Breanne required approximately 1 min and 45 s to complete the task. It was observed that students encountered little to no difficulty locating the bookstore hours from the bookstore homepage (<http://bookstore.yorku.ca/>) but found it more difficult to identify how to locate the bookstore homepage when presented with the university homepage (<http://yorku.ca>) at the onset of the task. During task completion, Breanne's think aloud verbalizations included the statement "I've always hated this webpage [the York University homepage]" and an expression of frustration (a sigh).

During the exit interviews, several students offered more comments about their experience in completing the project task and with the university websites in general. For example, Breanne commented that she normally prefers to use the Google search tool to find York University webpages rather than visiting the university homepage directly, and that she remembered noting that the university webpages were poorly designed when she was first applying for admission. Nora commented that the York University websites have small font and that it may have been a "fluke" that she found the bookstore hours so fast, as it was the familiar location of links along the left side of the bookstore homepage that directed her quickly to the hours link. Sara noted that York University websites have a lot of information condensed in small areas (which is difficult for students with print disabilities to read), and Julie commented that the OpenVULab pages were easier to work with than the York University webpages.

The two websites that were accessed by all students, namely, the York University and the York University Bookstore homepages were analyzed for WCAG 2.0 AA violations with AChecker. The AChecker results revealed three WCAG 2.0 AA success criteria violations (20 individual known violations in total) for the university homepage, and five WCAG 2.0 AA success criteria violations (51 individual known violations in total) for the bookstore homepage. These violations are related to incorrect or absent labels in the underlying code of the webpages that may be required to provide information for assistive technologies such as text-to-speech software. For example, the university homepage does not specify the document language, while the bookstore homepage includes 10 images that lack alternate text descriptions.

IV. Discussion and Future Work

Accessibility of the OpenVULab participant interface

Feedback from student participants about the OpenVULab participant interface was highly positive. All students were able to successfully create an account, set page display preferences,

and complete a project (including survey and task completion). While students did offer suggestions for improvement of the interface, there were no critical problems identified that prevented them from completing any of the steps. As none of the student participants required the use of Kurzweil 3000 to read the OpenVULab pages, the problem identified with the screen reader function becoming stuck on the customization widget did not hinder the students participating in this study. However, this could be a problem for other participants for whom the use of Kurzweil 3000 or similar assistive software is required.

The page display customization widget was both useful and easy to use. The observed frequency of use of adjusted page display settings in OpenVULab exceeded typical adjustment frequencies that students self-reported. This may correlate with the ease of use of the customization widget compared to other means of adjusting web browser settings. For example, text size (the most common parameter that students frequently adjust) can be easily enlarged with keyboard shortcut keys, while other adjustments such as text style and line spacing typically require more effort to adjust. Indeed, Nora indicated that she wasn't aware that a parameter such as line spacing could be adjusted on her web browser.

Objective accessibility testing of the OpenVULab participant pages revealed violations of a few WCAG 2.0 AA success criteria. It is evident that the use of an automated accessibility testing tool such as AChecker is valuable with respect to identifying potential problems related to the use of assistive software, yet less valuable with identifying problems related to the needs of students with print disabilities who do not use assistive software. For example, none of the suggestions for improvement offered by students about the survey format could be related to results of the AChecker report. Moreover, the feedback related to text to background color contrast for the survey pages obtained from AChecker directly conflicts with feedback from students. AChecker was not able to offer feedback regarding the understandability of survey questions, though some students found the wording to be sub-optimal.

Accessibility testing of York University websites

This study demonstrated that OpenVULab can be used to create videos of students' on-screen interactions and verbalizations as they work with websites, as well as administer pre- and post-test surveys. While the project task in this study was quite small, the results did demonstrate the usefulness of the tool for creating videos that can be reviewed and coded, and from which several pieces of useful information can be obtained.

We were able to compare the results of objective accessibility testing of two York University websites with the results of the OpenVULab videos (as well as exit interview comments). Overall, the data from the AChecker reports for the two webpages paints a different picture of

the actual subjective experiences of the students in this study, as they found it easier to work with the bookstore homepage than the university homepage. While the AChecker report identified many individual accessibility problems with both webpages (more for the bookstore page) and a cursory visual inspection of both pages (refer to Appendix E) may suggest that the bookstore homepage is cluttered relative to the university homepage, students more readily found what they were looking for from the bookstore page. This may be due to the more traditional layout of all key links appearing along the left side of the bookstore webpage, as this was the first area that most students examined. This information about the importance of the page layout was not detected by the automated accessibility testing tool.

Conclusions and future OpenVULab development goals

This study has demonstrated that the OpenVULab participant interface is easy to use and accessible for students with learning disabilities. Accessibility of the software for students with disabilities may be the ultimate acid test of accessibility, as students with disabilities may collectively represent a sample of users with a wide range of needs and preferences. The students in this study reported commonly having difficulty with finding information on websites (especially when visiting a website for the first time), with reading large chunks of text online, with small text, and cluttered layouts. These are challenges that any user may experience to a varying degree. As a result, the positive feedback from the students in this study about OpenVuLab suggests that the software is likely to be accessible to a very wide range of users, and that their suggestions for additional improvements to the software may benefit all users.

OpenVULab was also shown to be a useful tool for web accessibility research. The videos of the OpenVULab project revealed information about the webpages that did not appear in the AChecker reports of the same pages. Similarly, the exit interviews with students also yielded useful information about their experience completing the project task that objective accessibility testing did not address.

Future OpenVULab development goals include incorporation of student feedback into the design process. For example, this will include expanding the text options and line spacing range within the page display customization widget. It is also necessary to respond to the WCAG 2.0 AA violations identified by AChecker and the Kurzweil 3000 screen reading error in order to enhance accessibility of the tool for users such as students with visual impairments who require text-to-speech software when working on the computer.

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Appendix A: Pre-Test Survey Questions

1. Have you completed an online questionnaire before?
 - Yes
 - No

2. What type of disability, if any, do you identify with? You may select more than one answer for this question.
 - I do not have a disability
 - I have a learning or cognitive disability
 - I have a physical disability
 - I have a mental health disability
 - I have a hearing impairment
 - I have a visual impairment

3. How frequently do you work on a computer?
 - Very rarely
 - Rarely
 - Occasionally
 - Often
 - Very often

4. Which of the following settings do you typically adjust when viewing webpages or materials on the computer? You may select more than one answer for this question.
 - Text size
 - Text style
 - Line spacing
 - Color and contrast
 - Table of Contents display
 - Hyperlink emphasis
 - Size of buttons or drop-down menus
 - I don't typically adjust any of these settings

5. How would you describe your overall skills in using the Internet?
 - Very poor
 - Poor
 - Moderate
 - Good
 - Very good

6. How would you rate your ability to navigate through websites?

- Very poor
- Poor
- Moderate
- Good
- Very good

7. How would you rate your ability to locate information on websites?

- Very poor
- Poor
- Moderate
- Good
- Very good

Appendix B: Post-Test Survey Questions

1. How would you rate the ease of customization of text size within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

2. How would you rate the ease of customization of text style within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

3. How would you rate the ease of customization of line spacing within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

4. How would you rate the ease of customization of color and contrast within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

5. How would you rate the ease of customization of hyperlink emphasis within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

6. How would you rate the ease of customization of the size of buttons or drop-down menus within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

7. How would you rate the ease of reading the task instructions that appeared after you completed the pre-test questionnaire?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

8. How would you rate the ease of accessing this questionnaire after completing the assigned task from York University websites?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

9. How would you rate the ease of completing a questionnaire such as this one within OpenVULab?
 - Very difficult
 - Difficult
 - Moderate
 - Easy
 - Very easy

10. How would you rate your overall experience with using OpenVULab today?
 - Very poor
 - Poor
 - Moderate
 - Good
 - Very good

11. Please list any recommendations that you have for improving OpenVULab below.

Appendix C: Exit Interview Protocol

Thank you for participating in this testing session today. To conclude this session, I'd like to ask you a few questions to learn more about your experience participating in this study.

1. Did you find the options for customizing the display preferences in OpenVULab to be helpful?
 - Which options did you find the most helpful?
 - Were there sufficient customization options? If not, which additional options would you find helpful?

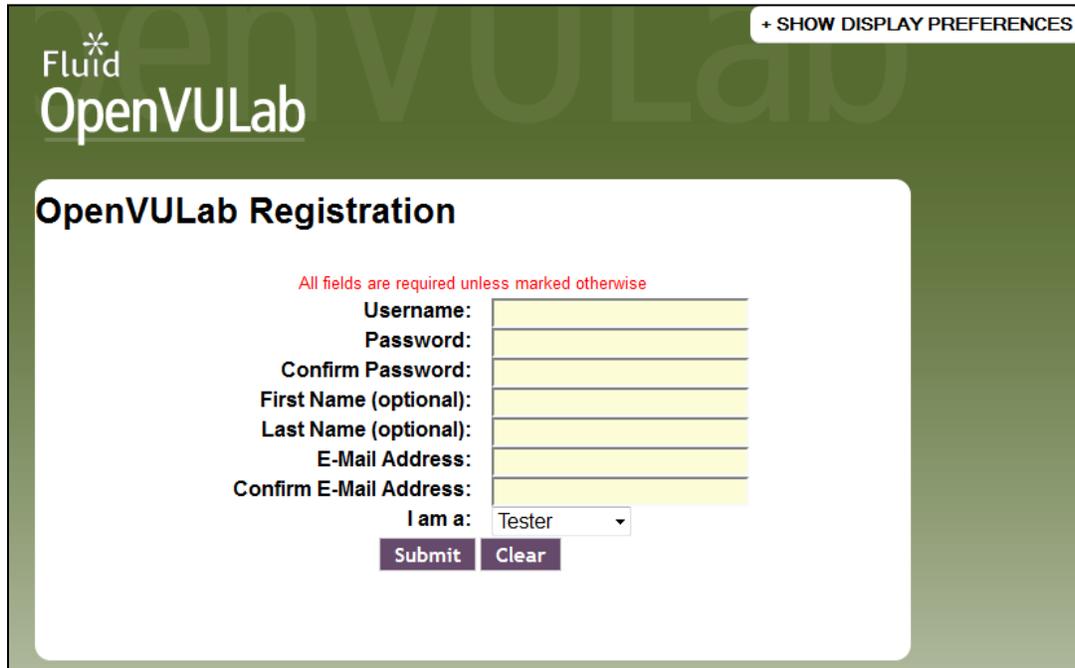
2. Did you encounter any other difficulties when completing either the introductory or concluding questionnaire?
 - Were the questions easy to understand?
 - Did you have difficulty selecting your answer (e.g., clicking in the correct box, making a selection from a drop down menu, or typing in a response to a fill-in-the-blank question)?

3. Is there anything else that you'd like to tell me about your experience today and the ease of use of OpenVULab?
 - What did you like the best about it?
 - What did you like the least about it?

Thank you for participating in this study. Your feedback has been very helpful today.

Appendix D: OpenVULab Screenshots

Account creation page



The screenshot shows the OpenVULab Registration page. At the top left is the logo "Fluid OpenVULab" with a small asterisk above "Fluid". At the top right is a button labeled "+ SHOW DISPLAY PREFERENCES". The main heading is "OpenVULab Registration". Below this is a red note: "All fields are required unless marked otherwise". The registration form includes the following fields: Username, Password, Confirm Password, First Name (optional), Last Name (optional), E-Mail Address, and Confirm E-Mail Address. Each field is represented by a yellow rectangular input box. Below the email fields is a dropdown menu labeled "I am a:" with "Tester" selected. At the bottom of the form are two buttons: "Submit" and "Clear".

Project homepage



The screenshot shows the OpenVULab Project homepage. At the top left is the logo "Fluid OpenVULab" with a small asterisk above "Fluid". At the top right is a button labeled "+ SHOW DISPLAY PREFERENCES". Below the logo, the text "Welcome joestudent" is displayed, followed by a link labeled "Sign Out". The main heading is "My Survey Projects". Below this heading is a section titled "Survey Websites for Usability" with a light gray background. Inside this section, the text reads "You've been invited to participate in the following usability studies!". Below this text is a link labeled "OpenVULab - Phase I".

Survey page

Fluid
OpenVULab

+ SHOW DISPLAY PREFERENCES

Pre-Test Survey

Questions marked with a * are required.

* Have you completed an online questionnaire before?

Yes

No

* What type of disability, if any, do you identify with? You may select more than one answer for this question.

I do not have a disability

I have a learning or cognitive disability

I have a physical disability

Project task introduction page

Fluid
OpenVULab

+ SHOW DISPLAY PREFERENCES

Phase I Project

Introduction

Your task is to locate the hours of the York University Bookstore.

You should know...
While taking this online survey your entire screen and your microphone will be recorded until you continue to the final step (experience survey)

[I understand, I want to continue.](#)

[I understand, and no longer wish to participate](#)

Appendix E: External websites accessed by students

York University homepage

The screenshot shows the York University homepage. At the top left is the York University logo with the tagline "redefine THE POSSIBLE". To the right is a navigation bar with links for "Glendon Campus", "Alumni", "Research", "Giving to York", "Media", "Careers", "International", "York U Lions", and "ACCESSIBILITY". Below this is a secondary navigation bar with "FUTURE STUDENTS", "CURRENT STUDENTS", and "FACULTY AND STAFF" tabs, and a search bar for "Search yorku.ca". A main navigation bar lists "UNDERGRADUATE ADMISSIONS", "PARENTS & FAMILY", "COUNSELLORS & TEACHERS", "GRADUATE ADMISSIONS", "CONTINUING EDUCATION", and "CAMPUS MAPS".

The main banner features a photograph of three students (two women and one man) in a red shirt talking outdoors. Below the photo is a red bar with the text: "BIENVENUE À GLENDON York's bilingual campus is located in midtown Toronto".

On the left side, there is a vertical menu with links: "ABOUT YORK", "PRESIDENT'S MESSAGE", "TAKE A TOUR", "DIRECTORY", "YORK ORGANIZATION", "FACULTIES", and "RESEARCH".

The central "UNIVERSITY NEWS" section contains three articles:

- Law Dean for a Day out to improve surroundings**: Third-year Osgoode Hall Law School student Andrea Hill served as the school's Dean for a Day on Feb. 13, while Osgoode Dean Lorne Sossin spent the day attending Hill's classes.
- York prof and former postdoctoral Fellow shortlisted for Canada Prize**: FES Professor Timothy Leduc and Stuart Henderson, a former SSHRC postdoctoral Fellow in York's Department of History, have been shortlisted for the Canada Prize in the Social Sciences.
- Author to talk about her book Scars and self harm**: Teen fiction writer Cheryl Rainfield will talk about Scars, a 2010 finalist for the Governor General's Literary Award for Children's Literature, and her own experiences with self harm, on Feb. 28.

On the right side, there is a "SPOTLIGHT" section with a video player and a "You Tube" icon, featuring "Meteorology graduate Mark Robinson visits York to explain his job as a storm stalker." Below this is an "EVENTS" section with the text: "Interested in a Career in Health Care? Maximize your summer experience! - Feb 16, 6-8pm".

At the bottom, there is a grid of links categorized into:

- APPLY NOW**: Undergraduate Studies, Graduate Studies
- GATEWAYS FOR**: Future Students, Current Students, Faculty & Staff, Parents & Family, Counsellors & Teachers, Glendon Campus, Alumni, Media
- ADMISSIONS**: Programs, Undergraduate, Graduate, International, Mature, College & University Transfer, Visiting, Access & Bridging, Part-time, Take a Tour
- ACADEMICS**: Faculties, Academic Advising, Calendars, Student Client Services, Libraries
- POPULAR SEARCHES**: Undergraduate Programs, Undergraduate Admission Requirements, Undergraduate Financial Support, Part-time Studies, Graduate Programs, Graduate Admission Requirements, Graduate Financial Support

At the very bottom, there are links for "Site Index", "Privacy & Legal", "Weather Status", and "Contact York University".

York University Bookstore homepage

YORK UNIVERSITY **U** **redefine THE POSSIBLE.**
Future students | Current students | Faculty & staff | Alumni | Visitors

Welcome To The York University Bookstores [Home](#) | [View Shopping Cart](#) | [Contact Us](#)

- Textbooks
- Textbook Rental
- Used Books
- Faculty Services
- General Books
- Stationery & Gifts
- Bookstore News
- Student Information
- York Shop
- U50
- Gift Certificates
- Events That Matter
- Promotions & Events
- Divisional Links
- Store Hours
- Store Locations
- FAQ

Home Page
Click on the Student Information Page for details.

Google ebooks New! Explore and buy Google eBooks! [Learn more](#)

Link [here](#) to read or subscribe to our Bookstore Blog.

Textbooks [CLICK HERE](#)
Find & Buy Your Textbooks
Look up your textbooks and print a list before you shop, or buy your textbooks online.

Student Information [CLICK HERE](#)
BOOKSTORE Winter Term 2012 Information
Now the Bookstore has art supplies!
Check out the "Art Competition" deadline extended till February 27th. A chance to win \$500 in art supplies - second and third prizes of \$100.

Used Books [CLICK HERE](#)
Sell Us Your Used Books!
Got used books? Need money? Click on the Used Books link to find out how much we'll pay for your used books. We buy used books year round - payment by credit or debit card. Photo ID required. Sign up for used book alerts.

Textbook Rental [CLICK HERE](#)
Welcome to the Bookstore's textbook rental program - Online & Now In-Store.
New! In-Store Rental Pilot Program - Click on this page for more details.

The York Shop [CLICK HERE](#)
SHOW YOUR SCHOOL SPIRIT!
Check Us Out!
The York Shop carries a wide variety of York Insignia active wear, headwear, backpacks, accessories and a great selection of gift items.

General Books [CLICK HERE](#)
STEVEN PINKER
THE BETTER ANGELS OF OUR NATURE
WHY VIOLENCE HAS DECLINED
Click on the image to the left to explore our wide range of new general books.

Stationery & Gifts [CLICK HERE](#)
Stationery & Gifts
Pens, Paper, Notebooks, Binders, Post-Its, and a wide range of Gifts!
Check out our range of calculators!
Diploma Frames
Click on the link below [alumni/frames](#)

Promotions [CLICK HERE](#)
YORK U BOOKSTORE
Photo: The Bookstore staff in their "fair trade" t-shirts for our recent "Red & White Day" promotion on November 16th.

Bookstore News [CLICK HERE](#)
Arbour Day at York
The Bookstore sponsored this year's Arbour Day planting of trees and shrubs on the York Campus.
See story inside.

Shipping & Delivery
Refund Policy
Privacy

YORK U50
YORKwrites Website
C-O-M-O-D-O AUTHENTIC SITE SECURED BY SSL

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