The Accessibility of MOOCs for Blind Learners

Aleksandra Królak	Weiqin Chen	Norun C. Sanderson	Siri Kessel
Lodz University of Technology	HiOA	HiOA	HiOA
Wólczańska 211/215	PO box 4 St. Olavs plass	PO box 4 St. Olavs plass	PO box 4 St. Olavs plass
90-924 Łódź, Poland	0130 Oslo, Norway	0130 Oslo, Norway	0130 Oslo, Norway
+48 426312715	+47 67238671	+47 67238673	+47 67238672
akrolak@p.lodz.pl	weiqin.chen@hioa.no	nsand@hioa.no	siri.kessel@hioa.no

ABSTRACT

The development of Massive Open Online Courses (MOOCs) has provided unique learning opportunities for many people. In the meantime, the lack of accessibility in some MOOCs has also created barriers for diverse learners. In this paper, we present the preliminary results from a study on the accessibility a selected set of MOOCs on the Coursera platform for blind learners who use screen readers and Braille to interact with computers and mobile devices.

CCS Concepts

• **Human-centered computing**→ **Accessibility** →**Empirical Studies in accessibility**

Keywords

Massive Open Online Course (MOOC); Accessibility; Blind; Screen reader; Braille

1. INTRODUCTION

According to the World Health Organization (WHO), an estimated 285 million people worldwide are visually impaired, of which 39 million are blind and 246 have low vision [5]. Massive Open Online Courses (MOOCs), as a type of e-learning and distance education, provide unique learning opportunities for underprivileged people, people with disabilities, elderly, and people who live in countries with poor infrastructure. However, the lack of accessibility in MOOCs has also created barriers for diverse learners. Blind learners often face challenges such as lack of support for keyboard navigation and poor compatibility with screen readers. According to [3], there has been limited research focused on accessibility within MOOCs and particularly in user-based empirical studies.

The goal of this research is to identify accessibility issues in diverse MOOCs for blind learners by conducting user-based studies and provide recommendations for improving the accessibility.

2. METHOD

This exploratory study took a qualitative approach towards identifying barriers and issues encountered by blind users of screen readers and Braille devices partaking in MOOC courses. Barriers and issues encountered by users are often found in the user interface of a MOOC platform. Consequently, to ensure all participants were exposed to the same user interface, the

researchers chose one MOOC provider, Coursera, as the case for this study. Typically, MOOC courses continue over several weeks, with weekly modules and exercises for students. Although observation sessions can disclose many barriers and issues encountered by users, it is not feasible to observe users over a longer period such as the length of a full MOOC course. Therefore, this study based its data collection on weekly self-reporting from participants completing the MOOC course in their own home. Thus, the methods chosen for data collection approach contain elements of case studies and diary studies.

Seven participants, of which 3 female and 4 male, were recruited through the Polish Association of the Blind in cooperation with the Institute of Electronics at the Lodz University of Technology. The participants were between 38 and 52 years of age with a good level of English proficiency. All of them use computers daily both at work and at home, including office tools, email clients, and browsers. All participants use screen readers for both PC and mobile devices, and two of the participants also use Braille technologies such as Electronic Braille Notetaker and Braille Display. Three of them had some experience with online learning. The participants were given information both orally and via email about what was expected of participants, their rights to withdraw from the study, and the agreed disbursement, before agreeing to partake in the study. All participants also signed a consent form.

Each participant was asked to complete a 4-week MOOC course offered by Coursera. They could choose a course topic within the area of their own interest. The only limitations given by the researchers were the length of the course (4 weeks) and the course provider (Coursera). Participants were asked to take notes on any barriers and issues encountered during the course, and report these to the researchers after each completed course week. The reporting was done through answering predefined open-ended questions in a document and sending the document via email. Before the start of the MOOC courses, each participant answered a semi-structured questionnaire to collect demographical information about participants, including assistive technology and previous experience with online learning.

3. PRELIMINARY RESULTS

The preliminary results of the study are presented in this section according to the four principles in the Web Content Accessibility Guidelines (WCAG 2.0) [4].

3.1 Perceivable

This principle requires that users must be able to perceive all the information and user interface components presented. The accessibility issues reported by the participants testing Coursera courses include lack of labels for buttons, especially the search form button and buttons in forms for entering text answers for test questions, lack of alternative text for graphical elements, and auto-start of time-based media that disturbs the screen readers.

3.2 Operable

This principle requires that the user must be able to operate and navigate with any type of input device, at his or her own pace, and receive feedback in case of errors. The main issue reported was related to poor header structure that caused problems with navigation. Examples of this problem are at the Home Page, where the first level header is followed by a third level header immediately, or at the My Account Settings page, which starts with a third level header instead of a first level one. Another issue was the lack of keyboard access to radio buttons for self-assessment. The buttons were clickable, but contained no text description. The participants were provided with enough time to complete the tasks and reported good error management.

3.3 Understandable

This principle requires that the content must be understandable for users. The participants reported that the courses have a clear, logical structure, there are no unexpected elements used, and all instructions are simple and easy to understand. The only issue was the lack of confirmation before submitting some information.

3.4 Robust

This principle requires that the content must be created in such a way that it can be interpreted reliably by as many user agents and assistive technologies as possible. The participants used a large number of tools for accessing the courses, including Windows, macOS, iOS, Apple TV and Android operating systems and web browsers such as Internet Explorer, Google Chrome, Mozilla Firefox, and Safari, as well as assistive technologies such as NVDA and Voice Over screen readers. The participants were able to complete the chosen courses with any of the third party technologies. However, some compatibility issues were reported by the participants, including incorrect reading of the button labels with links when using Google Chrome and very slow operation of Internet Explorer when used with the NVDA screen reader.

4. DISCUSSION

Studies conducted by Al-Mouh et al. [1] involved two blind or partially sighted learners and Coursera courses in selected disciplines including technology, design, humanities and physics. Bohnsack & Puh [2] conducted accessibility evaluation of five MOOC platforms (Udacity, Coursera, edX, OpenCourseWorld and Iversity) with blind users. The main issue identified for all MOOCs was the lack of correct language markers for screen readers. This issue was also reported by the participants in our research.

The above-mentioned user evaluations, both performed in 2013, show that the participants faced problems such as lack of notification for modal window opening, no alternative text for graphical elements, inappropriate heading structure disturbing the operation of screen readers, lack of labels for buttons, and no keyboard access to some form functions. All these were confirmed by the participants in our study. Since the two previous studies in 2013 some improvements have been made by Coursera, including better error handling, logical structure of the courses, and compatibility with mobile browsers.

Our study revealed additional problems with the accessibility of the selected. By default the auto-play option is enabled. It is difficult for blind learners to quickly locate Pause and Play buttons in order to stop the playback since there are no ARIA tags for these buttons. We have also found that different subpages in a course have the same title or invalid titles and include unnamed links which cause difficulties in navigation, e.g. on the welcome page of "Gender and Sexuality: Diversity and Inclusion in the Workplace" course link is read in the form "b14a700a78d0a0d225271160521e2a6c". There are also different accessibility issues in different web browsers, for example, Internet Explorer slows down the work of screen reader when playing multimedia content, in Chrome the links are read as webpage addresses in some courses (e.g."Dog Emotion and Cognition"), when trying to sign in to courses using mobile Firefox browser, the screen displays information that this browser does not support Coursera courses. Another identified problem is the lack of descriptions of radio buttons in the self-assessment form and course assessment form. Blind learners are not able to complete them because it is not possible for them to know which box to click. There is also lack of keyboard access to these items.

In our study, the iOS mobile app for Coursera was also tested. The main issues identified were the lack of access to the transcription of subtitles for some videos, lack of assigned roles to several elements (e.g. Course Info, Notes, Resources), no reaction to some gestures controlling Voice Over screen readers and limited amount of information presented in comparison to the full web version.

5. CONCLUSION AND ONGOING WORK

In this paper we have presented the preliminary results from a qualitative study aiming at identifying the accessibility issues in MOOCs for blind learners who use screen readers and Braille to interact with computers and mobile devices. Despite of the accessibility policy and continuous efforts by Coursera in making the platform and courses accessible, our participants still encountered barriers and issues when taking the MOOCs. The data analysis used for attaining the preliminary results presented in this paper was an informal analysis where the researchers read the delivered reports and summarized the feedback from the participants. Currently we are planning a more systematic analysis, e.g., Deductive Thematic Analysis, on the qualitative data collected in the study. Furthermore, we plan to recruit more participants with diverse visual impairments, extend the scope of the study to more MOOCs and platforms, and conduct in-depth interview and user testing to gain a better understanding of the accessibility of MOOCs for learners with visual impairments.

6. ACKNOWLEDGMENTS

7. REFERENCES

[1] Al-Mouh, N. A., Al-Khalifa, A. S. and Al-Khalifa, H. S. 2014. A first look into MOOCs accessibility: The case of Coursera. *Computers Helping People with Special Needs. Springer International Publishing. Lecture Notes in Com- puter Science*, 8547 LNCS (PART 1), 145–152.

[2] Bohnsack, M. and Puhl, S. 2014. Accessibility of MOOCs. *International Conference on Computers for Handicapped Persons. Springer International Publishing*. 141–144.

[3] Iniesto, F., McAndrew, P., Minocha, S. and Coughlan, T. 2016. The current st*ate of accessibility of MOOCs: What are the nex*t steps? *Proc. of Open Education Global Conference 2016*, (April 12-14, 2016), Krakow, Poland.

[4] WCAG 2.0 http://www.w3.org/TR/WCAG20/

[5] WHO | Visual impairment and blindness www.who.int/mediacentre/factsheets/fs282/en