

Accessibility of MOOCs for Blind People in Developing Non-English Speaking Countries

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Abstract. Besides the globally popular MOOCs, localized MOOCs specific to a region or language are also emerging. These specialized MOOCs often aim to address specific needs that are typically unaddressed by the global MOOCs. Such example is Almooc that aims to address the needs of the Albanian-speaking persons who lack English proficiency. Despite the MOOCs adage to include and offer education to all people, research has shown that their interface is not accessible to people with disabilities, such as the blind. To evaluate the level of accessibility of Almooc, in this paper we report findings from three different methods: usability testing, automatic accessibility checking, and heuristic evaluation. The results indicate that Almooc is not currently accessible to blind people, however, we present recommendations to easily overcome the discovered issues.

Keywords: Accessibility · MOOCs · Evaluation · Usability Testing · Automatic Accessibility Checking · Heuristics

1 Introduction

Education has been traditionally received by instructions delivered in brick-and-mortar institutions, but lately the technology is contributing to making it more widely available. Many universities are offering online courses using Massive Open Online Courses (MOOCs), which are available to large audiences and are promising to fulfil learning needs to millions of people, regardless of their geographical location or personal abilities and disabilities [1].

Currently, in Kosovo, there are 86 blind and visually attending primary and high school education. However, this number is very low estimating that typically 3% of people with disabilities (10% of total population) is blind and visually impaired. Hence, the real number of people from this community should be over five thousand, and those attending schools should be higher [2]. We believe, the stigma associated with this community as well as the financial difficulties these families face, contribute to leaving most of the blind unrecorded. The only school for the blind in Kosovo is mitigating this issue by promoting inclusion on regular schools and sending teachers to blind persons' homes, although this brings a heavy load on the school, considering the low number of

staff. Considering these issues, MOOCs could provide a platform to further alleviate the education process of the blind people.

Besides the globally popular MOOCs, such as Coursera¹, Udacity², Khan Academy³ and EdX⁴, localized MOOCs specific to a region or language are also emerging. These specialized MOOCs often aim to address specific needs that are typically unaddressed by the global MOOCs. Such example is Almooc⁵ that aims to address the needs of the Albanian-speaking people who lack English proficiency. Almooc (or Albanian MOOC) is an education platform that cooperates with distinguished Albanian teachers to offer free online classes to everyone. It started its activity at the end of 2013. Its vision is to offer a platform where everyone has access to qualitative education. Its purpose is to empower people with education that will improve their life and the community where they live. Currently, Almooc provides courses in Software Programming, General ICT, English language, Math, Physics and Chemistry. It offers over 70 courses with 16 instructors and over 47000 students.

To evaluate the level of accessibility of Almooc, in this paper we report findings from three different methods: usability testing, automatic accessibility checking using available tools, and heuristic evaluation. The results indicate that Almooc is not currently accessible to blind people, however, we present recommendations to easily overcome the discovered issues.

2 Related Work

In a previous research, we identified many issues concerning education of the blind community in Kosovo and surrounding region [3]. One of the main obstacles identified was that blind people lack independent navigation. Inadequate basic road infrastructure and classroom settings make it a challenge to provide accessible education for this community. Due to a lack of these basic school settings, blind students often do not receive training classes for navigation, as they will not be able to make use of such knowledge. Therefore, it becomes difficult for the blind people to attend schools, or even just go to class without a human escort when they live on campus dormitories [3]. Considering these issues, MOOCs are a great opportunity for the blind people who in this case are not able to engage in face-to-face learning. On one hand, educational institutions do not need to create accessible facilities, accessible equipment, accessible educational resources, or costly physical adaptations for this community. On the other hand, designing accessible MOOCs is technically and financially possible [4].

MOOCs have gained an impressive popularity, partly due its claim that they are open to everyone. However, their openness does not necessarily equate an access, as studies have shown that most MOOC websites do not fulfill minimum accessibility requirements [5, 6]. Hence, despite the MOOCs adage to include and offer education to all

¹ <http://www.coursera.org>

² <http://www.udacity.com>

³ <http://www.khanacademy.org>

⁴ <http://www.edx.org>

⁵ <http://www.almooc.com>

people, research has shown that their interface is not accessible to people with disabilities, such as the blind [7, 8, 9] or the elderly [10]. In spite of the opinions that in a single course MOOCs bring together diversity in ideas, cultures and regions, they currently exclude the disabled, which approximately comprise 15% of the world population [7].

MOOCs, however, can overcome inclusion barriers if developed with accessibility in mind [12]. Various studies suggest improving their accessibility by implementing metadata [13], content adaptation [14] and following the Web Content Accessibility Guidelines (WCAG) [15]. WCAG are comprised of 14 guidelines, and within these guidelines, 65 checkpoints that describe how developers could adapt their web content in order to make it accessible. Although WCAG remain the best source when designing accessible websites [18], their impact on improving the accessibility of the Web remained quite low throughout the period of its use [16]. Some sites are making exaggerated claims about their accessibility, with 30% of sites overstating their level of conformance to WCAG [17]. For the blind users, satisfactory level of accessing digital information is not guaranteed even when WCAG guidelines are followed [19].

Moreover, evaluating website accessibility against the WCAG guidelines is time-consuming task checking for compliance through the many guidelines. Instead of this, studies are being conducted evaluating web accessibility using IBM web accessibility heuristics, as these are more condensed and easier to work with [11]. We adopt such approach in this study when conducting heuristic evaluation of Almooc discussed in section 2.3.

2.1 Usability Testing

Participants and Procedure. We recruited two blind individuals to help us uncover usability problems when using Almooc. The first participant has a master's degree education and works as a lecturer at a public university. He has decent experience in using computers with screen readers to browse information on the web. The second participant has a bachelor's degree and works as a journalist at a public broadcasting news agency. He rarely uses a computer and mainly relies on using his smartphone with its built-in screen reader. However, none of the participants had previously taken any online course before. Both participants were tested on a computer running Windows 7, using the Internet Explorer browser and JAWS screen reader. Participants were required to conduct the following tasks: randomly select a course, register it, watch two video lectures, take a quiz, and contribute to the class discussion and chat.

Findings. The testing of Almooc was very difficult considering the many problems participants faced when accessing its interface. As a result, the second participant gave up in the beginning of the testing. The first participant made it through most of the tasks on lecture twelve of Physics course. Some of the main issues and positive aspects include:

- Initially, the participant had issues registering for the course, as he could not locate the appropriate link. He succeeded only on the third attempt.
- The participant could successfully start lecture videos and listen to its content, but diagrams and images inside the video were not accessible. For instance,

in cases when the instructor was explaining a concept and was referring to a diagram on his white board.

- Although the video playing speed was appropriate, a need for speed control was addressed by the participant.
- Navigating from a video to another video within a lecture was easy, however, going forward and backward within the video was difficult.
- Navigation from one lecture to another was easy.
- Access to a Quiz section as well as selecting and submitting answers was easy, but it was difficult to navigate from one question to another due to unlabeled buttons.
- The participant had issues accessing the Discussion page.
- The participant successfully navigated to the Chat section, he could read people's comments and provide his comment.
- Because of a lack of an appropriate labeling, the participant was unsuccessful in logging out of Almooc.
- The textual content across all pages during the entire session was accessible.
- Although the Almooc interface is in the Albanian language, many labels were still in English, which confused the participant.

These findings reveal that the majority of issues found are regarding missing or inappropriate labelling of links or buttons. These make the objects invisible for the screen readers and consequently unidentifiable and inaccessible for the participant.

2.2 Automatic Accessibility Checking

Procedure. To obtain technical evaluation insights of the Almooc interface, we conducted an automatic checking using the WAVE web accessibility tool provided as a chrome extension⁶. We randomly selected lectures and pages from two courses, Physics and English. For each course, we evaluated the webpages of two lectures. More specifically, we evaluated the Course Description page, the pages of two lectures containing the video recordings, and the Quiz page. Details of the two courses and their corresponding lectures is shown in Table 1.

Findings. The findings reveal that Almooc pages contain a high number of accessibility errors. The course description webpage, which contains information about the course and the instructors for all lectures, shows similar errors grouped into seven categories as described in Table 1. The majority of errors are associated with missing form labels.

Higher number of errors were also yielded for lecture webpages, which contained the video recordings and user comments concerning the lecture. Depending on the lecture, 37 to 49 errors were found, grouped into five different categories as described in Table 1. Same as with the course description page, most of errors were linked to missing form labels. Additionally, high number of errors were also recorded for missing alternative text and empty links. The quiz pages also yielded high number of errors, highest being concerning missing alternative text.

⁶ <http://www.webaim.org/extension>

Table 1. Number of errors found per category

<i>Course</i>		Physics						English												
<i>Level</i>		6th Grade			12th Grade				5th Grade			Who is?								
<i>Error Description</i>		<i>Webpage</i>	Course	Description	Lecture 2	Lecture 10	Course	Description	Lecture 2	Lecture 5	Quiz	Course	Description	Lecture 2	Lecture 10	Course	Description	Lecture 2	Lecture 7	Quiz
Missing Alternative Text			2	15	14		2	15	14		13	2	16	14		2	6	6		13
Missing Form Label			12	14	14		12	14	14		9	12	14	14		12	14	14		9
Document Language Missing			1	1	1		1	1	1		1	1	1		1	1	1		1	
Empty Heading			1	-	-		1	-	-		-	1	-	-		1	-	-		-
Empty Button			1	6	6		1	6	6		6	1	6	10		1	6	6		6
Empty Link			5	8	8		6	8	8		7	6	10	10		6	10	10		7
Empty Table Header			4	-	-		4	-	-		-	4	-	-		4	-	-		-
Total Number of Errors			26	44	43		27	44	43		36	27	47	49		27	37	37		36

The similarity of errors found, in terms of numbers and type, shows that accessibility issues persist through the entire Almooc interface. This is also an indication that the issues are mainly related to the architectural structure of the site, rather than the content offered in individual web pages.

2.3 Heuristic Evaluation

Procedure. As a third evaluation method, we conducted a heuristic evaluation. Three evaluators have independently evaluated the Almooc interface following the nine IBM web accessibility heuristics⁷. Evaluators randomly selected a course and lectures from Almooc and made notes about the problems discovered. To evaluate Almooc's compatibility with assistive technologies, various screen reader software was used, such as: Non-visual Access Desktop (NVDA)⁸, WebAnywhere⁹, and ChromeVox¹⁰.

Findings. The results from the heuristic evaluation reveal numerous issues that break the web accessibility guidelines and therefore make the Almooc website difficult to access. List of found issues, categorized by the nine web accessibility heuristics, is given in Table 2.

3 Discussion and Recommendations

Three different evaluation methods discovered very similar accessibility problems with the Almooc interface. The relatively high number of accessibility errors found, considering the minimal textual content Almooc pages provide, is an indication that the issues are mainly related to architectural structure of the website. This is also an indication

⁷ <https://iwc.oxfordjournals.org/content/16/3/507/T1.expansion.html>

⁸ <http://www.nvaccess.org>

⁹ <https://webanywhere.cs.washington.edu/wa.php>

¹⁰ <http://www.chromevox.com>

that the Almooc interface was designed and developed following a little or no attention to the accessibility guidelines. Moreover, issues persist through the entire Almooc interface and are not linked to any section in particular.

Table 2. Cumulative findings from three evaluators using the IBM web accessibility heuristics.

Heuristic	Cumulative findings
1. Provide meaningful and relevant alternatives to non-text elements	<ul style="list-style-type: none"> – Images and videos lack alternative description. – Inaccessibility of videos with sentences on the board or slides that are not completely read by the instructor and it is expected that student will read them. Or, the instructor refers to a diagram or image on the board or slide without describing its details. – Lack of alternative description of video controls, e.g., play, stop. – Video lectures lack subtitles.
2. Support consistent and correctly tagged navigation	<ul style="list-style-type: none"> – Partially tagged headings. – No access to homepage from the video lecture page. – No links to enable users skip to main content. – No way to go to the next lecture without exiting the current lecture first.
3. Allow complete and efficient keyboard usage	<ul style="list-style-type: none"> – Not possible.
4. Respect users' browser settings	<ul style="list-style-type: none"> – Changing preferred colors on a website not possible. – Page layout is responsive to text changes, e.g., text increase and decrease. – No control to increase the text only.
5. Ensure appropriate use of standard and proprietary controls	<ul style="list-style-type: none"> – Good, just some controls labels appearing in English, instead of Albanian.
6. Do not rely on colour alone to code and distinguish	<ul style="list-style-type: none"> – Generally, the site has good contrast. – When quiz answers are submitted, the results are indicated only using colours: red for incorrect and green for correct answer.
7. Allow users control of potential distractions	<ul style="list-style-type: none"> – Not possible to change the speed of video lectures. – Forward and Backward controls do not move through the video, instead enable moving through notes or comments students have posted at different times of the lecture.
8. Allow users to understand and control time restraints	<ul style="list-style-type: none"> – The webpage never expires.
9. Make certain the Web site is content compatible with assistive technologies	<ul style="list-style-type: none"> – No tab order for easy navigation using screen readers. – Hidden controls and content that are not visible on the page (and not meant for the user), are read by the screen reader. – In case of a pop up content, the screen reader reads the content of the page behind. – Many empty elements.

The majority of errors discovered during the three evaluations were related to missing or inappropriate labelling of objects on the website. Other issues that made the highest number of errors are regarding the missing alternative descriptions for images and videos. These issues make the objects invisible to screen readers and consequently unidentifiable and inaccessible to the participant.

Despite the high number of accessibility issues the Almooc interface has, the positive aspect is that these can be eliminated with minimal intervention. Most of Almooc pages are merely a replication of some template pages containing elements for a course, and making the template pages accessible will easily increase the accessibility for every course generated. This would affect the existing courses as well. Essentially, when the underlying system is re-engineered with blind users in mind, all content will become more accessible. However, this does not solve the problem of the course content. It is up to the instructor to have in mind accessibility for blind users when designing the course. This includes providing proper alternative description for images.

Another important issue discovered was related to video lectures content. Many were the occasions where the instructor referred to an object on their board or slide that expected the users to be able to see and follow instructor's explanation. Such issues can only be addressed by the instructors themselves who should have in mind blind students when preparing their video lectures. This would mean that they would need to explain everything they show on their slides.

To increase blind student participation within the class, Almooc should allow them to take part actively in discussions and other activities using their voice. For them talking through some interface is much easier than writing, which can improve their integration within the class.

4 Conclusion and Future Work

In this paper, we have presented the findings from an evaluation conducted to assess the accessibility level of Almooc, a MOOC platform dedicated to Albanian-speaking community. In order to get a comprehensive overview of accessibility issues, we conducted three different evaluation methods: usability testing, automatic accessibility checking, and heuristic evaluation. The findings indicate that Almooc has many accessibility issues and it is difficult to be used by blind people. However, on a positive side, Almooc's most accessibility issues can be easily fixed by making the general templates accessible, which in turn will increase the accessibility of every course generated, including those existing. What remains a challenge is making video lectures more accessible, which involves encouraging instructors to have blind people in mind when creating their videos. This will require from them to explain everything they present on their board or slides and not rely on students being able to see it themselves.

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