

Accessibility strategies for making MOOCs for people with visual impairments: A Universal Design for Learning (UDL) perspective

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Massive Open Online Courses (MOOCs) were designed to enhance access to education to all that desire it. The open access drive seeks to promote free and equitable access to basic, higher, formal and informal education. The main aim of MOOCs is to de-institutionalize education moving it from the formalized class to the open platform where there are no admission requirements. The second aim of MOOCs is to provide access to lifelong learning for those who want to learn for the sake of knowing and developing their competencies. The objective of this document analysis based paper is to analyze primary qualitative-research academic sources dealing with strategies to make MOOCs accessible to people with visual impairments. This paper uses Universal Design for Learning (UDL) principles as a lens through which accessibility of MOOCs to people with visual impairments are examined. The document analysis involved a careful examination of research methodologies that had been used to gather data. Fifteen academic sources were sought through formidable search engines. Specified inclusion and exclusion criteria were used to select the articles that were analyzed to answer the research question: What accessibility strategies can be employed to make MOOCs accessible to people with visual impairments? Lastly, recommendations are made towards making MOOCs more accessible for people with visual impairments.

Keywords: MOOCs, accessibility, universal design for learning, disability, inclusion, visual disabilities.

Introduction

Massive Open Online Courses (MOOCs) were designed to enhance access to education to all that desire it. The open access drive seeks to promote free and equitable access to basic, higher, formal and informal education. The main aim of MOOCs is to de-institutionalize education, moving it from the formalized class to the open platform where there are no admission requirements. The second aim of MOOCs is to provide access to lifelong learning for those who want to learn for the sake of knowing and developing their competencies. MOOCs are offered to anyone with access to a computer and reliable Internet connection. As the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD: 08) states “technology design should take into account accessibility and usability features for the protection of the human rights of persons with disabilities”. The same organization also called for all those that signed on this UNCRPD treaty to “make sure that persons with disabilities are able to get access not only to general education but also to tertiary education, vocational training, adult education and lifelong learning without discrimination and on an equal basis with others”.

Though anybody can offer a MOOC, there are pioneers and big players of MOOCs like Coursera which offered more than 1000 courses from 112 universities in 2015 and edX which has offered more than 500 courses from more than 40 universities. This paper provides an analysis of literature on the accessibility of MOOCs to people with visual impairments. Accessibility to MOOCs has not been regarded as a serious problem that is worth researching (Seale, 2014). What is accessibility? This term is viewed and used differently in the higher education sector. However, for purposes of this article I adopt Seale’s (2014: 09) definition that accessibility is about “removing barriers to participation and engagement in online experiences and the degree to which someone can access an online resource regardless of their disability, technology or environment”. I also adopt the view of International Organization for Standardization (2012: n.p.) that accessibility is about “the usability of a product,

service, environment or facility by people with the widest range of capabilities”. For MOOCs to be accessible they have to be designed in such a way that they can be adjustable to suit the needs of all learners. IMS Global Learning Consortium 2004 *Section 2* outlines five perspectives from which accessibility could be conceptualized, these are: (1) presentation, (2) control methods, (3) access modality, (4) learner support, and (5) availability of alternative-but-equivalent content, formats and activities (Seale, 2014). According to Cooper (2014) alternative formats could be in the form of audio recordings, comb-bound versions, ePub formats and e-Books. Wentz, Jaeger and Lazar (2011, n.p.) view accessibility as having learning environments that are “compatible with assistive technologies, such as narrators, scanners, enlargement, voice-activated technologies, refreshable Braille, and other devices”. According to Anastasopoulos and Baer (2014), MOOCs just like any other online courses enhance access to education but the people who are unable to enjoy this privilege predominantly are those with visual and hearing impairments.

One would ask; why do technology developers have the least interest in making learning environments accessible? There are seven causes that have been cited for exclusion of not including accessibility features, that is; because it increases the costs of the technology, elongates the time taken to develop technological initiatives, only provides for a small market, demands for special design skills, leads to unappealing products, raises challenges with accessibility support, necessitates one to cater for different disabilities which could further exclude other users (Wentz, Jaeger & Lazar, 2011, n.p.).

Universal Design for Learning

Universal Design for Learning (UDL) is an appropriate concept to frame the accessible design of MOOCs. According to Orkwis and MacLane (1998, p.7) the main objective of UDL is to provide access to education for diverse learners. Morales (2007) assert that UDL simplifies “performing tasks by designing environments, products, and services easier to use by everyone. Therefore, [it] benefits all people of all ages and abilities. The prospect of universal design applied to teaching and learning is especially important” (Sanchez-Gordon & Luján-Mora, 2014, p.531). McGuire, Scott & Shaw (2006, p.169) state that the Center for Applied Special Technology (CAST), who pioneered UDL, focused on “promoting access, participation, and progress in the general educational curriculum for all learners”.

In the case of South Africa, Rababate (2011, n.p.) states that the Higher Education Opportunity Act of 2008 pronounced UDL as a product of human rights and special education legislation that has adequate logic to inform best educational practices. He further recommends three principles (discussed below) that when followed could make the learning environment; MOOCs in this case, more accessible. The learning environment should provide: (1) multiple means of representation, (2) multiple means of action and expression and (3) multiple means of engagement (Elias, 2010). Multiple means of representation can be provided through customising the way information is displayed, providing auditory formats for blind users, large print for partially sighted users and visual formats for users with hearing impairments. Language and symbols used should have proper definitions. In addition, mathematical and scientific language should be decoded and clarified. Multiple means of action and expression could be provided through careful and inclusive planning of activities that the learner is to perform. The learner should be able to independently navigate around, communicate, compose and solve the given problems (Bocconi & Ott, 2013, p. 330). Multiple means of engagement can be provided through giving learners a variety of ways in which they can learn without compromising the set learning outcomes and objectives. Learners should also be given different levels of learning demands and opportunities for self-regulated learning.

Review of related literature

The question of digital inclusion and exclusion has been tackled by several disability scholars (Sanchez-Gordon & Luján-Mora, 2014; Seale, 2014; Agarwal, 2013; Watling, 2011; Fitchen, Asuncion, Barile, Ferraro & Wolforth, 2009). Sanchez-Gordon & Luján-Mora (2014), caution that accessibility has to be considered from two interrelated aspects; content and platform accessibility. Seale (2014) laments that accessibility to MOOCs has not been regarded as a serious problem that is worth researching. Watling (2011: 491), identifies three ways in which digital exclusion can take place; that is through “high set-up costs, inadequate technical support and exclusive design practices”. Sanchez-Gordon and Luján-Mora (2015), state that appropriate MOOC design can heighten accessibility, so he suggests that there should be extension of adaptive content presentation, through which users could update their accessibility preferences in their learner profile. The adaptive content presentation extension (Sanchez-Gordon & Luján-Mora, 2015, p.182) personalizes content delivery so it can be more accessible and usable. For this to happen, they state that there must precise “detection of the user accessibility needs through user profiling and a mechanism that allows transparent selection and presentation of the appropriate adaptations according to the registered needs” (p.182). Equally, Bohnsack and Puhl (2014), report that their study on MOOC accessibility reveals that there is incorrect web design.

An evaluative study on the accessibility of five MOOC platforms; Udacity, Coursera, edX, OpenCourseWorld and Iversity was conducted by Bohnsack and Puhl (2014). The results of this study indicate that none of these MOOCs were accessible for people with visual impairments, particularly blind people. Fitchen et al. (2009) conducted two studies on the accessibility of e-learning materials for university students with visual impairments and the results revealed that blind students are more affected by the exclusionary design practices than students with low vision. Rizzardini, Chang, Gütl and Amado-Salvatierra (2013), from the Galileo University in Guatemala report on the barriers they found in the MOOC they evaluated. These barriers included; unavailability of ‘alt’ images, access keys and non-existent sound controls (p.637). They then embarked on designing an equitably accessible MOOC. After the design exercise the MOOC had the ‘alt’ images, access key, site map and all other general accessibility characteristics (p.638). Burgstahler, Corrigan and McCarter (2005), assert that some people with disabilities cannot participate in MOOCs due to inaccessible design. They also assert that people with visual impairments face a challenge with accessing graphic and video content due to inaccessibility.

The notion of accessibility is guided by Web Content Accessibility Guidelines 2.0 (WCAG) principles (W3C, 2008).The WCAG 2.0 principles provide specific aspects that determine if the web page can be used by people with different abilities. These principles can be tested and evaluated in order to know if there is conformance to accessibility needs. These principles are Perceivability, Operability, Understandability and Robustness (POUR). Each of the four principles is going to be unpacked in order to build a foundation on how best MOOCs could be designed to accommodate people with visual impairments. W3C pose some questions that seek to clarify each accessibility principle. The questions are outlined below:

1. Perceivability
2. Operability
3. Understandability
4. Robustness

Research Methodology

The research methodology that this paper uses is qualitative in nature. Academic sources were reviewed in order to establish different accessibility strategies that the authors deem critical in order to make MOOCs accessible to people with visual impairments. The research question this study seeks to address is: What accessibility strategies can be employed to make MOOCs accessible to people with visual impairments?

Selection of academic sources to be analyzed

The researcher collected the material that was analyzed using document analysis; the decision of studying sources between 2014 and 2016 was made because MOOCs are a new innovation. In addition, the notion of accessibility to MOOCs has not been explored from the visual impairment perspective in my current online learning environment. It was therefore more logical for the researcher to study the sources that were published in the last two years. Al-Mouh, et.al. (2014); Bohnsack and Puhl (2014); Iniesto, et.al (2014) also attest to this dearth of research on MOOC accessibility. A literature search was performed using the EBSCO link that provides databases like Educational Resource Information Centre (ERIC) and Academic Search Premier. When the researcher could not find enough resources addressing the issue of MOOC accessibility, the librarian assigned to my college was approached for further assistance but the sources sent were inappropriate for the desired analysis. More searching was conducted through Google Scholar. The search criteria included selection of appropriate keywords, the period within which I had limited the study to, peer-reviewed academic works written in English language and articles focusing on people with visual impairments. The researcher used the internet to search for publicly available materials on the issue of 'MOOC accessibility' for 'people with visual impairments' and 'blind people' particularly. Though the aim was to only focus the study on the qualitative articles from peer reviewed academic journals like the *Journal of Visual Impairment & Blindness*, *The Chronicle of Higher Education* and *Technology and Disability*; the paucity of such resources forced the researcher to consider other academic sources such as books, book chapters and peer reviewed conference proceedings that discuss the issue of MOOC accessibility for people with visual impairments. The researcher collated, sorted and assessed the sources for their significance in the topic of discussion. Twenty five sources were collected, after sorting, only 10 were considered appropriate in responding to the main research question. The sources discarded were either not specific or had no valuable contribution or depth in addressing the topic at hand. Another set of sources that was excluded were the academic sources that were based on quantitative methodologies. The researcher also used a fellow researcher within the department who helped in the selection of academic sources that were relevant for addressing the topic at hand.

At the end, the following articles were analyzed:

	Year	Author(s) and Publication name	Title	Publication
1	2015	Sánchez Gordón, S., & Luján Mora, S.	Adaptive Content Presentation Extension for Open edX. Enhancing MOOCs Accessibility for Users with Disabilities.	The Eight International Conference on Advances in Computer-Human Interactions
2	2015	Kent, M.	Disability and eLearning: Opportunities and barriers.	Disability Studies Quarterly, 35(1)
3	2016	Sánchez Gordón, S., & Luján Mora, S.	Design, implementation and evaluation of MOOCs to improve inclusion of diverse learners.	User-Centered Design Strategies for Massive Open Online Courses (MOOCs), 115-141

4	2014	Anastasopoulos, N. & Baer, A.M.	MOOCs: When Opening Doors to Education, Institutions Must Ensure That People with Disabilities Have Equal Access	Journal of Collective Bargaining in the Academy, Vol 0, Article 39
5	2015	Rohs, M. & Ganz, M.	MOOCs and the Claim of Education for All: A Disillusion by Empirical Data	Universidad Galileo: 545-550.
6	2014	Al-Mouh, N. A., Al-Khalifa, A. S., & Al-Khalifa, H. S. (2014, July).	A first look into MOOCs accessibility.	In Proceedings of HCI Korea (pp. 29-36). Hanbit Media, Inc.
7	2016	Iniesto, F., McAndrew, P., Minocha, S. & Coughlan, T.	The current state of accessibility of MOOCs: What are the next steps?	Universidad Galileo: 545-550.
8	2015	Blanck, P.	eQuality: Web Accessibility by People With Cognitive Disabilities	Inclusion, 3(2), 75-91
9	2016	Park, K., Kim, H. J., & So, H. J.	Are Massive Open Online Course for Accessibility.	In Proceedings of HCI Korea (pp. 29-36). Hanbit Media, Inc.

Data Analysis Procedure

To answer the main research question, categorical-content approach (Lieblich, Tuval-Mashiach & Zilber, 1998, p.12), particularly content analysis was deemed appropriate. The collected academic sources were analyzed through identifying common words across all the narrators. This methodology was considered suitable for understanding other scholars' contributions on strategies to make MOOCs more accessible for people with visual impairments. In the section that follows, the researcher describes the basic data collection method, the materials that were collected and the data analysis procedure.

These sources were read thoroughly, highlighting emerging themes as informed by the framing principles of UDL. Each emerging theme was given a specific color code, and then associated sub-themes signifying a new accessibility strategy were given the color codes from the main themes. This data analysis approach was suitable because it allowed for the proper examination of the narrative materials that were collected through literature search. This approach tends to focus on the many detached parts of the story addressing a single research problem. The researcher also used other scholars or researchers within the department to help in the analysis of sources that were selected. These researchers served as peer reviewers and fulfilled the triangulation function of research.

Presentation and Discussion of Results

Theme 1: Multiple means of representation

This theme reveals strategies that could be used to make MOOCs accessible. In this regard, Sanchez-Gordon and Luján-Mora (2016), make several suggestions that will be outlined below: Alternative formats of the learning material should be provided, so that different learners can engage with their learning material in the means that suits their need. Keyboard navigation has to be activated instead of mouse-based navigation which tends to favour the sighted or visual learners. Main functions should be able to be performed through keyboard shortcuts, as most people with visual impairments use these shortcuts when working in online spaces. These authors also stress the importance of using attribute values in order to alert the blind learners about what is on the page. They also assert that the 'ALT' text should always be modified programmatically. This would allow for easy and ongoing updating of the online platform without losing the accessibility feature.

Equally, Iniesto, Rodrigo and Moreira Teixeira (2014), presented a series of recommendations on how content could be made more accessible; “adding locutions, subtitles, audio description, satisfy basic usability aspects both graphical and visual, use accessible font types and sizes, and use optimal levels of contrast”. These researchers also postulated that the process of designing MOOCs or any other online learning platform is to ensure that there is ongoing testing and re-testing of the platform by people with visual impairments.

Theme 2: Multiple means of action and expression

Iniesto, Rodrigo and Moreira Teixeira (2014), suggest that registration and log-in procedures should be accessible through assistive technologies in order to enable people with diverse needs to access online learning platforms. They also highlight language as another reason that MOOCs become non-accessible. Anastasopoulos and Baer (2014), stress the importance of ensuring that all content including tags, captions, photos, graphics and scanned images are accessible.

Theme 3: Multiple means of engagement

Iniesto, Rodrigo and Moreira Teixeira (2014), stress the importance of offering textual descriptions to all graphical and tabular information to enable the learners to know of what each of these visual formats comprise. Sanchez-Gordon and Luján-Mora (2016), outline five guidelines as prescribed by Authoring Tool Accessibility Guidelines (ATAG) 2.0; these are: (1) making the production of accessible content a possibility, (2) providing the necessary capacity development for authors to know how to create accessible content, (3) supporting the management of alternative content creation for non-text content, (4) providing authors with the creation of accessibility templates, and (5) providing support in the creation of accessible pre-authored content. Iniesto, et.al. (2016), postulate that the MOOC creators should be encouraged to provide transcripts for audio and video resources so as to enable the MOOC users to access the online platform in any desired format.

Limitations of the study

This article is based on articles from different parts of the world but none is from the African perspective because the search did not yield any positive results. Some of the academic sources analyzed were not guided by any theoretical or conceptual framework. Most of the precise academic sources that clearly indicated accessibility strategies were conference proceedings.

Conclusion

As much as MOOCs are meant to encourage open access to education to the masses, if not designed appropriately they further alienate people with visual impairments. Universal Design for Learning provides clear guidelines that could assist in making online platforms accessible. Further to the UDL, conforming to the guidelines given by the different authors that have been analyzed here could lead to the design of an accessible MOOC for people with visual impairments.

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