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Guidance on how Learning at Scale can be made more accessible

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Guidance on how Learning at Scale can be made more accessible

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ABSTRACT

While learning at scale has the potential to widen access to education, the accessibility of courses offered on Massive Open Online Course (MOOC) platforms has not been researched in depth. This paper begins to fill that gap. Data was gathered using the participatory 'Evidence Café' method. Thematic analysis identified characteristics of accessible courses on these platforms. These characteristics include elements of both technology and pedagogy. Capturing and analysing expert insights enables this paper to provide guidance on how online courses can be made more accessible. The findings suggest that course production teams need to work collaboratively with providers to address issues of accessibility and involve learners in design, testing and evaluation. Well-designed tutor-supported activities that follow web accessibility and usability guidelines are needed, as well as educator training on accessibility.

Author Keywords

accessibility; disability, evidence café, MOOCs

INTRODUCTION

The major Massive Open Online Course (MOOC) providers have been offering courses for more than eight years and have expanded their offering to include a wide range of continuing professional development courses. These have the potential to widen access to education. However, they are not always accessible for disabled learners. Research in this area has mainly been limited to reports and analytical papers that focus on technical aspects rather than on learning design and the human factors related to disability. This paper fills this gap by identifying key issues in the field of accessibility and disability, and providing guidelines on how online courses can be made more accessible for disabled learners.

The study used the Evidence Café approach [3, 4]. This participatory method supports the translation of research into practice, supporting a deep understanding of the use of evidence in practice, and providing a forum for knowledge exchange. Fourteen experts in online learning and learning at scale, with theoretical and practical knowledge of accessibility, were brought together (online due to COVID-19 restrictions) to address the issue of accessibility of learning at scale for disabled learners. Experts were split into three heterogeneous groups to share knowledge in an informal manner.

In these groups, with interaction focused on selected discussion objects, participants shared their definitions of accessibility and disability as well as their views of the most and least accessible aspects of learning at scale. Their descriptions of accessibility and disability revealed how complex these definitions are. Experts approach these terms from different angles which relate to aspects of context, including: the learners involved, the technological formats and pedagogies employed, the reasons why accessibility is required and the ways in which this can be achieved.

This paper begins by reviewing relevant literature on accessibility. It goes on to describe the methods of data collection and analysis. It then analyses the definitions on accessibility and disability that emerged from expert insight and provides guidance on ways in which courses on MOOC platforms can be made more accessible to disabled learners.

BACKGROUND

Most of the work on accessibility in learning at scale has been carried out in the context of MOOCs. As Sanchez-Gordon & Luján-Mora [12] reported in their systematic literature review, research on MOOC accessibility is limited. They found 40 studies with empirical results relevant to researchers studying accessible online courses. Their review showed that it is difficult to generalise from existing research. Studies in this area tend to be technical reports that evaluate accessibility using Human Computer Interaction (HCI) techniques. The priority is usually assessment of adherence to Web Content Accessibility Guidelines (WCAG), the de facto standard of web accessibility[1].

In these studies, expert evaluation dominates. Typically, one or more accessibility experts apply specific heuristic criteria using automatic tools [1, 10]. Other authors have included end-users in this assessment process. Users with visual impairment in some cases [5, 8] and elderly people in others [2].

These investigations included courses from various well-known platforms including Coursera, Udacity, edX, OpenCourseWorld, Iversity, Udemy, FutureLearn, MiríadaX and NovoEd. The focus is typically on evaluation of a single MOOC, the studies tend to involve vision-impaired learners as participants and a single standard is employed.

To gain a better understanding of the accessibility barriers associated with learning at scale, a combination of different accessibility evaluation methods and a broader sample of end-users with accessibility needs is required. Moreover, as Iniesto [7] points out, there is a lack of research about the efforts that those who produce the courses and run the platforms are making to increase accessibility.

Smith and her colleagues [13] provide an overview of the process of developing a MOOC that includes accessibility based on the experiences of educators involved. They found that much of the work on MOOC development and design is ad hoc, and showed how difficult it is to get development teams to work together.

Iniesto [6] interviewed MOOC providers, including both educators who create materials and facilitate learning, and technologists who develop and maintain platforms. Their findings show that MOOCs can be valuable for disabled learners and indicate that legislation acts as a driver for accessibility. They found there had been limited progress towards producing accessible MOOCs, or tailoring MOOCs to meet the needs of individual learners with accessibility needs.

When considering accessibility, it is relevant to consider a characteristic of MOOCs on some platforms is the high degree of interactivity that facilitates and reinforces the bidirectional communication between learners, and with course teams [14]. In MOOCs, the role of the course team is often less prominent than in other forms of online learning [11].

In order to gain the view of experts in this area, including MOOC providers and experts in the area of online learning, this study asks: 'How do expert researchers and practitioners understand accessibility and disability on MOOC platforms?' and 'How could courses offered on those platforms be made more accessible to disabled learners?'

METHODOLOGY
In order to answer these research questions, we used a participatory approach called Evidence Café, conducting our research online due to COVID-19. An Evidence Café is an informal workshop-style event where expert participants are split into groups to discuss an issue guided by a discussion object [4]. The discussion object in this case was a worksheet, the design of which was guided by principles of equitable knowledge exchange. This was used to facilitate meaningful conversations between practitioners and academics.

In focus groups, the data gathered is often influenced by group culture and individual personalities. The discussion object addresses this issue by giving participants a shared language to discuss the topic at hand. Furthermore, it is impossible to complete all sections of the discussion object if each participant is not given an opportunity to voice their thoughts. As is normal in Evidence Cafés, each group's activities were overseen by a facilitator.

Individuals with extensive knowledge and experience of online distance education were invited to participate in the research [10]. A snowball sampling technique was followed. The recruitment process was designed to generate a heterogeneous sample, involving researchers, learning designers, practitioners, and policy makers with different affiliations.

The study involved 14 participants from three countries, each with practical and theoretical expertise on online courses. Informed consent to participation was given by all participants. Activities took place in groups of five or six, with groups selected to maximise diversity of perspectives.

ACCESSIBILITY AND DISABILITY
Participants' definitions of accessibility and disability revealed how complex these definitions are. Expert definitions were contextual, considering: the learners involved, the technological formats and pedagogies employed, the reasons why accessibility was required and the ways in which this could be achieved.

The study showed that no activity in online courses is fully accessible to all learners. Learning content accessible to one person may be inaccessible to another. There can be tensions between what is needed to support different disabilities, therefore experts narrowed the focus of accessibility to 'usable by as many learners as possible' rather than having a broad focus on 'all learners' or 'all people'.

When placing accessibility in context, it is necessary to expand the definition and include groups that are often excluded from definitions of accessibility. The focus is typically on barriers that people face in relation to physical, cognitive, or mental impairments. However, other groups, including international learners, non-native speakers, learners with caring responsibilities, and people with neuro-diversity issues (dyspraxia or motor difficulties) may struggle to keep up with synchronous discussions. Consideration of accessibility should include these groups.

Participants reported obstacles to accessibility (or certain features of online courses that might be inaccessible) that related to both the technology and pedagogy learning

material. They noted that online courses require access to an appropriate device and internet connection, and this can be problematic. Participants also referred to various assistive technologies, including subtitled videos and user personalisation technologies.

However, while the accessible interface of a platform is important, pedagogy was seen to be crucial. Relevant aspects of pedagogy included decisions about learning design, learning material and activities; time allowed for activities and assessment; group and individual tasks, and sequencing of activities.

Both the technology and pedagogy should enable learners, irrespective of their background, to exercise their right of equitable access to education, maximizing the ability to engage with learning material and learn effectively.

Technological flexibility includes providing access to the learning content in both video and audio form, and options to change colour and text size. Pedagogical flexibility includes providing learners with a variety of tasks, designing collaboration so that learners working in smaller groups can benefit from each other's expertise, and offering additional time to respond. The definitions of accessibility and disability that emerged from the Evidence Café were:

- **Accessibility** relates to the ability to design a course based on a platform that transcends barriers that different groups of people face while learning, presenting material in diverse technological formats using a variety of pedagogical methods. A course is accessible when it offers equitable access to groups of people who face diverse barriers (including disability) and maximises their ability to engage with material so that they learn effectively.

- **Disability** relates to barriers created by catering to assumptions about what most people can do. Disabilities include physical, cognitive, motor or mental difficulties /impairments, as well as barriers associated with factors such as dyslexia and age. People also face barriers when a course is not in their preferred language. Disability may involve technological or pedagogical barriers to learning.

The next section provides guidance on making courses on MOOC platforms more accessible to disabled learners. It is important to consider the strong relationship within the aspects proposed.

GUIDANCE ON MAKING LEARNING AT SCALE MORE ACCESSIBLE TO DISABLED LEARNERS

Technical guidance indicates to use accessibility standards.

1	**Ensure courses meet WCAG standards.** These standards cover multiple elements, including contrast, text, legibility, navigation, and ensuring that the sites can be used on both mobile and desktop. Facilitate integration with assistive technologies
2	**Include an accessibility statement.** Online courses should include an accessibility statement. This is a legal requirement in the UK, and a government digital services template is available online.
3	**Agree universal design for learning principles (UDL)[2] for STEM subjects for different screen readers.** Screen readers are a form of assistive technology that renders text and images as speech or Braille output. Their rendering of formulas and symbols is inconsistent and needs to be standardised.
4	**Avoid use of inaccessible text-based files.** Many PDFs cannot be used with screen readers[3].

Table 1. Technical guidance.

Pedagogical guidance includes aspects to consider when designing the educational resources by the educators.

5	**Design activities that provoke discussion and encourage learners to use platform functionality to support discussion.** Fragmented discussions are difficult to follow when using screen readers, so threaded discussions make courses more accessible. Learners should be encouraged to engage in conversations using responses, rather than producing a series of single posts.
6	**Allow ample time for activities.** Some learners will need time to pause, digest and then move on next steps. Learning design should include time to revise important material and prepare for assessment.
7	**Avoid use of sub-optimal resources.** External links may not meet the accessibility standards of the course. Graphics, tables, maps, and graphs should be explained fully with text to improve understanding. Training may be required on how to describe different elements. Learners should be encouraged to check the accessibility of resources that they share.

Table 2. Pedagogical guidance.

Training and experience are key values for educators and those teams producing the materials.

8	**Train educators in how to adjust materials for disabled learners.** Make this a part of induction training, covering both issues and solutions. Promote understanding of ways in which certain activities are inclusive for different groups. Provide access to expert advisor.
9	**Tutor-supported activities should follow web accessibility and usability guidelines.** Educators, designers and facilitators should be trained to be aware of potential cultural barriers, simplify the language of learning materials, provide a flexible schedule for assessment, and produce PDFs with accessibility in mind.
10	**Build on the experience of overcoming accessibility barriers in physical contexts.** The offline environment is often less accessible than the online environment, so it is important to use that experience when designing courses.

Table 3. Training and experience guidance.

Personalisation and alternative formats allow learners to choose their learning path.

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[2] UDL guidelines http://udlguidelines.cast.org/
[3] Indiana University Knowledge Base for PDF accessibility advice, https://kb.iu.edu/d/bfua

11	**Capture user needs on a profile.** Preferences can be set for accessibility, and relevant guidance offered automatically. Where last-minute design changes or targeted support are possible, courses can be adapted to meet specific needs.
12	**Provide alternative formats of learning content**. Include learning activities using different modalities so learners can select based on their needs. For example, videos should include transcripts and subtitles as well as the presenter's face (to support lip reading).
13	**Include support for non-native speakers.** Subtitles, transcripts, and translations can aid comprehension. Keep language simple where possible and encourage learners to do this when they provide comments or offer peer feedback. Crowd-sourced translations can be developed on some courses.
14	**Consider learners with limited internet bandwidth:** Offer downloadable content and offline resources. Avoid live (synchronous) sessions or record them and add subtitles. Compulsory collaborative activities should be asynchronous and allow ample time for completion.

Table 4. Personalisation and alternative formats guidance.

Collaborative guidance encourages the universities, platforms and learners to work together.

15	**Universities and platforms should collaborate to address accessibility issues in a timely manner.** Academics and production teams need to be aware of features and limitations of the platform so that adjustments can be made ensuring courses are as accessible as possible.
16	**Take learner needs into account, involving them in the design, testing and evaluation of courses.** The design process should be research-informed, rather than relying on assumptions. Employ a diverse group of testers when developing new courses.

Table 5. Collaborative guidance.

CONCLUSION

Given the uncertainty of the future of learning during the pandemic era, improving accessibility of online courses is crucial in order to support learners around the world who would not otherwise have opportunities to learn. The definitions of accessibility and disability developed in this study can be used to address in an informed manner the policy issue of accessibility to education. Together with the guidelines set out above, they can be used by teams developing courses on MOOC platforms to raise awareness and to enhance the design of courses to assist a smoother learning journey for all learners. This research is limited to the experience of a single Evidence Café. More research is needed to study the applicability and evaluation of the guidance and its implications for accessible learning at scale.

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