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## ARTICLE

# Accessibility of MOOCs: Understanding the Provider Perspective

Francisco Iniesto, Patrick McAndrew, Shailey Minocha and Tim Coughlan

Massive Online Open Courses (MOOCs) have become an accepted way to make learning opportunities available at large scale and with low cost to the learner. However, only if these are made accessible will they be able to offer flexibility of learning and benefits to all, irrespective of disability. Experience in providing accessible online learning at distance universities suggests that this can be best achieved through understanding different roles and the options in planning for adjustments to be made. To effectively apply similar approaches to MOOCs, it is necessary to understand the various viewpoints and roles of stakeholders and how these impact on accessibility. This includes educators who create materials and facilitate learning, and technologists who develop and maintain platforms. In this paper, we report the results from a study involving semi-structured interviews to investigate the perceptions and accessibility-related processes of MOOC platform accessibility managers, platform software developers and designers, and MOOC accessibility researchers. Our results show the awareness that MOOCs can be valuable for disabled learners, and indicate that legislation acts as a driver for accessibility. However, our investigations suggest limited progress to date in either producing universally accessible MOOCs, or tailoring MOOCs to meet the needs of individual learners with disabilities.

**Keywords:** MOOC; accessibility; MOOC providers; learning design

## Introduction

MOOCs offer lower barriers to participation when compared to other online learning opportunities. They provide openness within a structured learning framework, minimal financial burden as compared to formal learning opportunities, scope for individual planning in terms of the learner's time and preferred pace and place, opportunities for social learning, and the chance to gain new skills and knowledge. Ensuring that MOOCs are accessible will extend the benefits of learning via MOOCs to learners, irrespective of their disabilities. The importance of accessibility to digital resources is widely acknowledged specifically for e-learning (Kelly, Phipps and Swift, 2004). Information and communications technology (ICT) offers opportunities to people with disabilities and people of any age including people aged over 55 years (referred to as 'older people') to improve their wellbeing through socialisation, lifelong learning, and for re-skilling and employability (Bühler & Fisseler, 2007; Vila, Pallisera & Fullana, 2007).

However, research focused on the accessibility of MOOCs is limited and accessibility does not appear to have been considered in a consistent way when designing online learning resources including MOOCs. At the same time, the need to incorporate greater access for those who

declare disabilities is being highlighted (US Department of Justice, 2015). Indeed, the Porto Declaration on European MOOCs (2014) highlights the aspect of providing "opportunities to all", which can only be achieved if MOOCs are accessible to all.

There has been limited research focused on accessibility within MOOCs (Iniesto et al., 2016) and particularly in user-based empirical studies. In terms of accessibility assessment with learners, Al-Mouh et al. (2014) evaluated ten Coursera courses of different disciplines such as technology, design, humanities and physics for their suitability for blind or partially sighted learners. Two participants were included in the evaluations: they had problems in some key tasks such as browsing the contents, accessing video-lessons or performing tests. Bohnsack & Puh (2014) conducted accessibility evaluation of five MOOC platforms for blind users: Udacity, Coursera, edX, which are popular in the US and OpenCourseWorld and Iversity in Germany, and included one blind participant in the evaluations. Except for edX, all the other platforms had severe technological shortcomings such as lack of correct language markers for the screen readers. While these studies indicate that MOOC platforms offer limited accessibility, the studies themselves are limited in only focusing on visually impaired learners and having just one or two participants performing the evaluations.

As Seale (2014) argues, there is a need to understand the multiple viewpoints of stakeholders in accessibility

practice, such as those of educators who create materials and facilitate learning, and of technologists who develop and maintain platforms. Understanding how these stakeholders see their role will provide a way to identify how they can be involved in achieving accessibility in MOOCs. At the same time the process of stakeholder engagement helps to raise awareness of accessibility challenges.

This paper reports research with design teams working on MOOCs to capture their practices and constraints through a series of stakeholder interviews. The outcomes of the thematic analysis conducted from the interviews are presented and these then lead to further steps to research accessibility in MOOCs, such as including interviews with disabled learners. The paper is organised as follows: an overview of disability in lifelong learning; our approach to the empirical studies; the results and discussion from the first phase of stakeholder interviews; and, conclusions and next steps.

### Disability and accessibility in the lifelong learning

Disability affects approximately 15% of the world population (roughly one billion people), as estimated in the first report on disability of the World Health Organization (WHO, 2011). The definition used by WHO in its International Classification of Impairments, Disabilities and Handicaps (1980), is that a disability:

*“is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.”*

This view of disability as an impairment is also reflected in the definition within the Equality Act (2010):

*“You’re disabled under the Equality Act 2010 if you have a physical or mental impairment that has a ‘substantial’ and ‘long-term’ negative effect on your ability to do normal daily activities.”*

This medical view of disability as a deficit in the person is considered dated by many in disability research; however, this view is somehow embedded in our societies. Disability can appear as an old fashioned term that is focussed on deficits, activity limitations and participation restrictions, including negative aspects of the interaction of the individual in their health. Alternative views, of which the social model (Shakespeare, 2006) is a common example, consider that a disability should not be limited to physical problems (medical model); it also depends on the social and cultural environment of the individual, their age or economic difficulties (Mole, 2013). An example of the transforming potential of a change in society view can be seen in the evolution of the Paralympics movement to demonstrate how able the “super-humans” can be once the correct adjustments are made. Such demonstrations of ability are transient and assist only a few people (Bush et al., 2013) unless similar initiatives can be scaled to apply more generally to society.

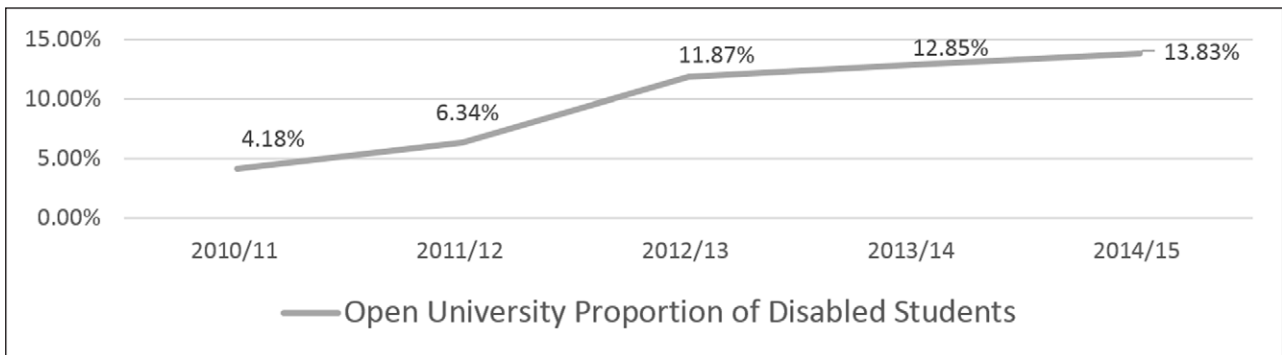
MOOCs through their global and free operation have the potential to provide opportunities for online learning to all and enable and empower people who may otherwise be excluded. While this potential has received little direct research there are several encouraging actions. The broader consideration of accessibility as a factor is reflected in the approach of MOOCs within the European Association of Distance Teaching Universities (EADTU) enhancing the term “openness” in the concept of open accessibility (Jansen & Schuwer, 2015). There are also a range of European Commission supported projects related with MOOCs and accessibility. These include:

- ELearning, Communication and Open-data: Massive Mobile, Ubiquitous and Open Learning (ECO eLearning) where the essential goal is the inclusiveness and accessibility applying the concept of “MOOCs for everybody” as a pedagogical approach (Tejera & Osuna, 2013).
- MOOCs for Accessibility Partnership (MOOCAP) which is a European project focused on providing education on accessible design in ICT using MOOCs, the objective is to design courses in how to create accessible media and content, such as web sites, mobile apps and office documents (Draffan et al., 2015).
- There are also a few MOOCs that include disability within their topic or focus, for example, the health MOOCs run by Birmingham University at Future-Learn.<sup>1</sup>

The changing attitude of society to disability is also shown in the growing proportion of learners who declare a disability. This growth has been particularly apparent in the choice of distance education universities for their studies. For instance The Open University (OU) has more disabled learners than any other university in the UK and Europe (The Open University Annual Report, 2015). OU’s Equality and Diversity Annual Report (2014) states:

*“More than 21,000 disabled students are now registered, representing just over 12% of the OU learner body. This is double the proportion of three years ago and far in excess of the performance indicator in the University’s equality objectives.”*

Figures for the proportion of registered disabled learners are continuing to grow (see **Figure 1**) however, as Richardson (2014), points out, learners with disabilities are still achieving poorer results than those who have not a recognised disability. Being aware of this challenge, the Open University, since 2012, is raising awareness and bringing about an institutional change to curriculum design (Slater et al., 2015). Using a learning analytics approach, Cooper et al. (2016) investigated those OU modules in which accessibility was a dominant factor in determining the completion rates of disabled students and focussed on the remedial efforts of those modules. The authors found that disabled students are less likely to complete a module than non-disabled students (revealing wide variation between modules).



**Figure 1:** Adapted from Widening Access and Success. Monitoring Report: Disability (CICP, 2016).

For the open content released by the OU, the proportions of learners who identify themselves as having a disability was found to be even higher. In recent studies Law et al. (2013) suggest that learners with disabilities are using Open Educational Resources (OER) from the OU, MOOCs being part of the OERs. These OERs consist of websites: OpenLearn (19% of visitors); iTunes U (13% of visitors) and YouTube EDU (17% of visitors). Data from the OU's Open Media Unit (OMU)<sup>2</sup> in 2014 show that the numbers have increased slightly for OpenLearn (23%) and iTunes U (18%), and decreased slightly for YouTube (14%).

OpenLearn provides access to freely available learning resources and this data indicates that such lifelong learning opportunities may be particularly relevant to disabled and aging learners. This view is supported by other studies considering approaches that integrate education, work and personal life in a continuous process and allow citizens to be able to access the knowledge and develop it both personally and through work. A study related to imparting digital skills to people aged 55 years and over (Minocha et al., 2015) recommends the use of OERs in the form of MOOCs as a suitable approach for training and opportunities for re-skilling which can keep them employed. Perryman and de los Arcos (2016) found no significant differences in disabled and non-disabled survey respondents' open educational practices. Their data shows that disabled respondents are, on the whole, older, less qualified and less likely to be in full-time employment than non-disabled respondents, with mental health problems being the most common disability. Coughlan et al. (2016) have recently used interviews with a set of scenarios, which illustrate different topics of accessibility in open learning, in order to identify emerging themes that are specific to this context. Their findings confirm the importance of accessibility of open learning in terms of learner experience and that accessibility should therefore be considered when evaluating services and in reference models of open learning.

It is difficult to know the proportions of learners taking up MOOCs (Guo & Reinecke, 2014) given the perceived lack of commitment in MOOC learners (Christensen et al., 2013). Further, there are no published studies relating the number of learners with disabilities taking up MOOCs and the interests they have in MOOCs. However the data from distance learning and OER indicate that the level of interest is likely to be at least in line with the proportion of disabled people in the population, which is 15%.

**MOOCs and accessibility: A User-based empirical study**

This research is part of a larger project that aims to identify the accessibility issues in MOOCs and develop guidelines to improve their accessibility. The project research questions are as follows:

- RQ 1. How can MOOCs help learners with disabilities to improve their knowledge and skills?
- RQ 2. How could the accessibility of MOOCs be improved?
- RQ 3. How could MOOCs resources be adapted to meet the accessibility needs of the learners?

The research reported in this paper explores these questions from the perspectives of MOOC providers. For RQ1, we have elicited the response to this sub-question from MOOC providers:

- RQ1 a. How do educators and MOOC providers see MOOCs as being useful for learners with disabilities?

The themes corresponding to RQ2 and RQ3 are included in the interview-data (as discussed later in this paper). The research questions will be continually investigated in our research programme and will be reported in future publications.

Interviews help to understand the point of view of educators and learners with disabilities and the way accessibility could be improved and the resources adapted to their needs. We applied semi-structured interviews (Ayres, 2008) to explore the perspectives of stakeholders on the importance of accessibility in the MOOC environment. Our focus in interviewing individuals involved in the MOOC development was to understand how they think MOOCs can be useful for learners with disabilities, and to learn about the current management of accessibility in the MOOC platforms and course providers, and the approaches they are using to adapt the content to the learner. In accordance with BERA (2011) ethical guidelines, we sought ethical approval for the research from the University's Human Research Ethics Committee. A total of twelve interviews were conducted with accessibility content managers of MOOC platform providers, platform software developers and designers and those with a range of expertise in the MOOC community (**Table 1**).

The semi-structured interviews focused on three main topics corresponding to the research questions:

- Data availability and knowledge about users with disabilities.
- Accessibility and daily work, in dealing with course providers and the platform.
- MOOCs and adaptation, how to show the information to the end user.

However the semi-structured nature of the interviews enabled us to expand on the interviewee’s comments during the interview.

**Findings**

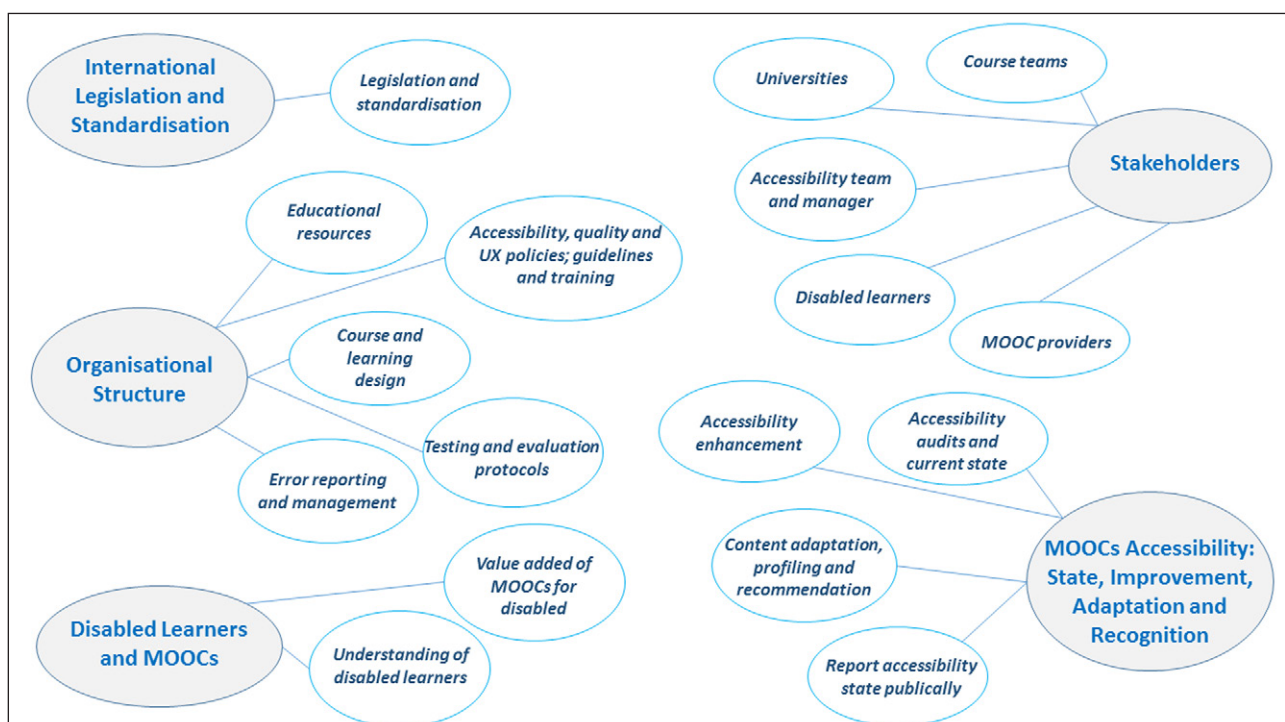
An inductive approach for coding the interviews has been followed using complete transcripts of the interviews. An inductive approach of qualitative data analysis allows the researchers to capture the emerging themes from the data without making assumptions related to the research questions (Ladapat, 2010). The transcripts were read and annotated using the 6-phase methodology by Braun

and Clarke (2006). The results have been collated using NVIVO<sup>3</sup> qualitative analysis software. The analysis generated the thematic map shown in **Figure 2**. The codes represent the key words appearing in the transcriptions. These were then clustered into the following five themes by grouping related codes:

- **Disabled Learners and MOOCs.** The reasons why MOOCs could be beneficial for learners with disabilities.
- **Organisational Structure.** Structural processes of the organization: data, statistics, policies, guidelines, educational resources, learning design, accessibility testing policies, evaluation and errors reporting.
- **International Legislation and Standardisation.** International legislation and standardisation of accessibility.
- **Stakeholders.** All the bodies that are part in the management of MOOCs, course creators, accessibility managers, the universities and the MOOC providers and their partners.
- **MOOCs Accessibility: State Improvement,**

Profile and number	Five accessibility content managers of MOOC platforms, three platform software developers and four researchers in the MOOC community
Contexts	Europe, North America and Latin America
Countries	UK, Spain, Portugal, The United States, Ecuador and Guatemala
Platforms	ECO eLearning project, FutureLearn, UNED COMA, UAb iMOOC, edX and Telescopio
Expertise	Accessibility experience in eLearning projects and research in MOOCs

**Table 1:** Sample of MOOC platform providers, MOOC course providers, platform developers/designers and researchers in the MOOC community for the study.



**Figure 2:** A thematic map representing the themes and codes.

**Adaptation and Recognition.** The knowledge of accessibility in the platforms and their resources, audits, current accessibility issues, how to improve them, adaptation in user preferences, the way to make the accessibility status of a course public.

We now illustrate each of the themes through direct quotes from the interviews. These anonymised quotes appear with permission and in some cases have been translated from the original language as indicated.

In terms of **“Disabled Learners and MOOCs”** there was a general consensus that there is a lack of monitoring of learners with disabilities in MOOCs. There was also a common belief that disabled learners can get the same benefits from MOOCs as non-disabled, and for that reason they should be fully accessible to them. In general, there is an optimistic perception of MOOCs being useful for learners with disabilities in reflections such as the value added to cater for disabilities:

MOOC Researcher 2 MR2 (translated from Spanish): *“You only need to pay when you want a certificate, for a person with disabilities that is an added value (...). The value is the lifelong learning, MOOCs are great because they can use the certificate to get a job”.*

There is a lack of understanding of disabled learners. For example:

MR2: *“MOOC’s philosophy is open and informal learning, then sometimes the student does not want to provide personal data because it is a free course. (...) If you want such an informal learning without being a registered student at the University, you cannot ask for a lot of data”.*

The **“Organisational Structure”** theme represents processes that show the maturity of an organisation in the management of accessibility; there is a need to improve that structure inside organisations promoting accessibility as part of their quality scheme. This theme includes the quality and user experience (UX) policies, the guidelines and training:

Content Manager CM5: *“I think it’s important to carefully consider the application design from a user experience perspective we’re lucky to have a very talented UX team here, (...) we’re working on optimising it [the design] for all learners, not just for people with disabilities, it takes a lot of careful thought and consideration and a knowledge in accessibility and user experience, again education and training, but I think it is the awareness which is key”.*

There is a need for error reporting, code-testing and UX evaluation, and negotiation amongst the involved stakeholders:

Software Developer SD1: *“when we have a new module or a new feature that uses new code, we check the building blocks that are part of the front end; the*

*front end developer and the designer test it using a screen reader or a voice over (...). It is a dialogue, it is not always perfect for everybody and there are arguments and we take decisions. But we just do it when we build a new module, when we make changes in an existing one we make very general tests”.*

A separate theme of **“International Legislation and Standardisation”** was apparent with concern over the impact on the MOOC environment. Modifications to US and European legislation might help to improve accessibility in the near future by extending the need to comply with the law to MOOCs. However, as indicated by a legal settlement from last year in the US, rather than improving the quality of eLearning, this could limit it to reactions to a compliance approach:

MR1: *“countries with strong legislation and determined to fulfil it, such as the US, combined with the fact that current MOOC platforms are open source development communities”.*

CM5: *“We have an international audience using our courses including the course content and each of them and are subject to their own laws and legislation. We tell them that this is our recommendation (...) ultimately the responsibility lies with them and if it is reported to us that course content is inaccessible or that students with disabilities are having a difficult time using their course content, the support request goes directly to the course team responsible for maintain that course”.*

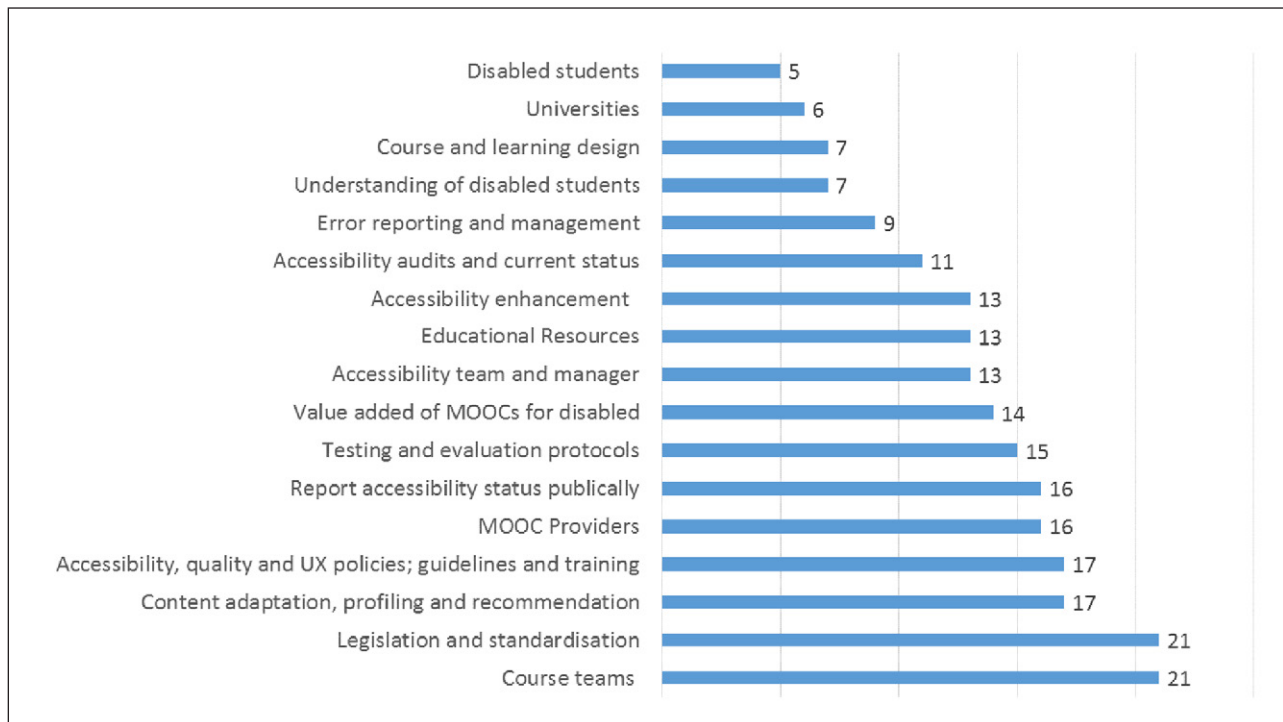
With regards to **“Stakeholders”** an important issue was the relations between the different roles, and the concurrent responsibility on the course teams to develop accessible materials, when those teams often do not have proper training in accessibility:

CM4 (translated from Spanish): *“There are very motivated course teams that surprise you and even send the subtitles in English, and others who do not do anything and they do not see the sense on doing it [creating accessible content], they do not see the utility of that work”.*

It was noted that many universities lack a culture of creating accessible content:

MR1 (translated from Spanish): *“There are three types of universities: those universities who have no idea about accessibility; those which have developed awareness but their level of development is primitive and they don’t have an infrastructure; and those ones which have both: awareness and accessibility infrastructure”.*

Finally a theme was identified that gathers different aspects related with **“MOOCs Accessibility: State Improvement, Adaptation and Recognition”**, including how MOOC providers consider accessibility could be improved:



**Figure 3:** Most frequent codes appearing in the interviews.

CM3 (translated from Spanish): *“The easiest thing would be to work on Universal Design, make designs as easy as possible, with no complications; but it [the design] can be complex, for example if you are using a mobile or a tablet”.*

There are common reflections related to the adaptation of the content:

CM1: *“It would be interesting that from the beginning users could decide their preferences on how they wish to receive the content, so when you start the course the preferences you have decided are already set”.*

**Figure 3** shows the level of recurrence of the codes (themes) appearing in the interviews and indicates the common interests those interviewed had in specific topics. The five most common codes all relate to a focus on the course teams involved in the creation of the MOOCs, or the legislation and guidelines that are needed to be followed by the producer:

CM1: *“The only big barrier to actually seeing from our point of view accessible courses is just the time and effort it takes to make something accessible (...) is up to the course creator to take the time to write the scripts or to write descriptions for visual materials and in ways that they might not think of doing initially or producing documents in a way that can be accessible”.*

On the other side, the less recurrent codes in our data include those that have to do with understanding disabled learners and course and learning design. There is a lack of data collected around disabled learners in MOOCs despite awareness that this could be useful:

CM5: *“the only data we have are the support requests that come in where learners will self-identify as having a disability; we don’t ask learners to reveal that information to us and we do not do any tracking (...). So we try to keep a position that we don’t know that number but we do know that it is significant number and something we take seriously”.*

MOOCs have massiveness as one of their characteristics, which means that thousands of learners might be reporting errors and problems. However, there are generally very limited resources to rectify these:

SD1: *“we work in terms of two weeks sprint cycle so it is quite quick feedback, in terms of being able to solve the problem, which is usually the case, and we are able to prioritise fortunately all incidents in the next two sprint cycles so that means in a maximum of four weeks we are able to fix something (...). A lot of the time even when the course is live, we are still fixing things the first weeks even the first runs, there is a flexible boundary”.*

It is important to take into account the accessibility standards – however, some perceive them merely as a way of fulfilling a legal requirement.

MR1: *‘standards help and you can always ask directly the accessibility preferences of the user, although there are still people who think we should be guided by the International Classification of Functioning (ICF) for these kind of questions. I do not agree with this’.*

MR4 (translated from Spanish): *“Our aim is to raise awareness – protocols should be treated as an educational approach and an awareness to the*

*accessibility issues. I do not know how this is treated on other platforms than in the US, but currently the protocols are purely a matter of law enforcement".*

**Discussion**

There is a lack of data on disability in eLearning, either via building profiles or during registration processes. The potential use of this data, if it existed, has previously been identified (Porter, 2015). The interview-analysis indicates that MOOCs are not an exception. The low level of commitment required to study a MOOC can create an additional difficulty in capturing rich data, however the survey based data from OER content presented earlier (Law et al., 2013) does indicate how this can be overcome, at least on a sample basis.

It is a matter of concern that the concept of learning design was not commonly raised in the discussion on meeting accessibility needs, while the prevalence of the use of legislation for that commitment was commonplace. We have suggested a design-based approach to respond to accessibility in a holistic manner. Our research methodology and project’s ethos is based on the approach of Universal Design for Learning (Rose & Gordon, 2014). The intention is to set out to design for access with the widest possible range of functional capabilities.

However there has been some criticism of approaches to designing for accessibility both for the risks in leading to a lowest common denominator result – i.e. producing something that underperforms for many by just meeting the needs for all – and for the difficulty of ensuring that all aspects are taken into account. An alternative position has been described as “Inclusive Design”. Inclusive Design seeks to avoid some of the issues noted in Universal Design by looking to augment a central design by adding in a consideration of particular user groups so that they are included, potentially through an alternative design

rather than the single design assumed in the concept of universal design (Clarkson et al. 2013). In the case of MOOCs the only approach that we have seen which has a focus on inclusive design is the ECO eLearning project. The opening up of education through MOOCs and OERs has emphasised the challenge for both approaches. In Universal Design the availability of open content does imply a genuine universality that makes consideration of all sectors impractical, and so devalues its offering and can make meeting its aims seem a hopeless task.

While the concepts of universal design and inclusive design both encourage positive consideration of those with particular needs, a further approach is to view the design process as one of designing for diversity amongst the population. All users have their diverse needs and in practice the approach leads to a model of alternative solutions around a core learning design. This model is aligned to that implemented at the OU in its Securing Greater Accessibility approach and its aims to “*strike the right balance between digital augmentation and the human element in providing accessible services*” (McAndrew, Farrow & Cooper, 2012). Accessible learning design in The Open University (Toetenel & Bryan, 2013) aims to avoid the trap of looking at the technology that is needed for implementation by considering learning design in terms of learning outcomes, model of pedagogy and pattern of interaction with those involved.

**Conclusions and future work**

To conclude, we have summarised the current position that has emerged from our findings thus far for each of the themes, and we list some suggestions for improving MOOC accessibility (see **Table 2**).

The exploratory nature of the interviews and the use of a heterogeneous sample across roles and institutions in a research project such as this, where there has not been

Theme	Position	Suggestions
Stakeholders	There is a general view that responsibility of creating accessible content falls on course teams.	Providers should increase the effort in developing the skills of the course teams to create accessible content.
Organisational Structure	Accessibility is not always embedded in the routine design and development activities of the educational context of organisations.	Producing accessible educational resources requires clarity from the organisation in accessibility policies, guidelines and managing reported accessibility incidences.
International Legislation and Standardisation	Legislation and standards play a predominant role in the development of accessible MOOCs.	Further focus on learners, their preferences and learning design, has to be offered rather than aiming only to follow the minimum legal requirements.
Disabled Learners and MOOCs	General perceptions are that MOOCs can be valuable for disabled learners if they are accessible.	Explore the potential of developing MOOCs based on social models of disability.
MOOCs Accessibility: State, Improvement, Adaptation and Recognition	There is a common understanding that MOOC platforms do not profile the learner’s preferences. It would also be useful to indicate the accessibility state of the course.	Not profiling the preferences of learners makes it difficult to deliver, or even recommend, the content in an accessible way to the learner. A first step would be to clearly inform learners about the different formats available and the accessibility of course content.

**Table 2:** Positions and comments from the analysis of the interviews.



significant prior research, is well suited to a process of thematic analysis (Thomas, 2006). We understand our project to be the first of its kind that has adopted a focus on what the MOOC providers and researchers think in terms of accessibility. As the first stage of an ongoing research project (Iniesto et al, 2016), it has been useful to understand the views of MOOC researchers and MOOC providers, and what these stakeholders see as being useful in MOOCs for disabled learners. After this stage of the research, we have conducted further interviews to fill the gaps discovered during the analysis: for example, educators or content creators who are responsible for thinking about accessible content and formats; and domain experts in the areas of learning analytics, the self-directed learning and eLearning quality, and who influence the design, development and evaluation of MOOCs.

There is a need to complete the picture to include learner perspective as well. Our next study, therefore, aims to capture the learners' experiences with MOOCs. Such a study will need to take into account the importance of selecting participants, as Hammersley & Atkinson (2007) indicate, with and without disabilities. We will endeavour to cover as many different disabilities as possible to enrich the quality of the data (Petrie & Bevan, 2009). This study will combine our understanding of provider perspective with an understanding of the individual contexts of learners when interacting with MOOCs, the challenges in their learning caused by disabilities, the expectations they have from MOOCs, and their recommendations for improvements.

Qualitative studies can help identify user expectations and the point of view of educators in how MOOCs can be helpful to learners with disabilities, while quantitative studies are useful for understanding the demographics of learners and how the educational resources could be improved and adapted to their needs. Accordingly, in the next stages of our research project, it will be necessary to analyse data from online surveys and online learning activity. We also aim to review the technical aspects of MOOCs through an accessibility audit, which will include expert-based heuristic evaluations and user-based testing of the MOOC platforms and courses.

The belief that MOOCs can offer accessible learning has been the key theme in this study. While there has been a clear awareness of legislation and organisational needs amongst the stakeholders, it is evident that more needs to be done to understand the accessibility needs of the learners, and ways to adapt the content to address a wide range of disabilities. Further research needs to be carried out to explore the potential of MOOCs in offering open education to the most disadvantaged groups.

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### Competing Interests

The authors have no competing interests to declare.

### Notes

- <sup>1</sup> Birmingham University MOOCs at FutureLearn, <http://www.birmingham.ac.uk/postgraduate/courses/moocs/index.aspx>.
- <sup>2</sup> OMU, <http://www.open.ac.uk/about/open-educational-resources/what-we-do/open-media-unit>.
- <sup>3</sup> NVIVO, <http://www.qsrinternational.com/nvivo-product>.
- <sup>4</sup> Open World Learning, <http://www.open.ac.uk/iet/main/research-innovation/research-projects/owl>.
- <sup>5</sup> Global OER Graduate Network, <http://go-gn.net/>.

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