A MIXED-METHODS STUDY WITH MOOC LEARNERS TO UNDERSTAND THEIR MOTIVATIONS AND ACCESSIBILITY NEEDS

Francisco Iniesto
Institute of Educational Technology, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK,
francisco.iniesto@open.ac.uk 0000-0003-3946-3056

Patrick McAndrew
Institute of Educational Technology, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK,
patrick.mcandrew@open.ac.uk 0000-0002-9016-154X

Shailey Minocha
School of Computing and Communications, Faculty of STEM, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK, shailey.minocha@open.ac.uk 0000-0002-9246-5045

Tim Coughlan
Institute of Educational Technology, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK,
tim.coughlan@open.ac.uk 0000-0002-0891-5438

ABSTRACT

An accessible Massive Open Online Course (MOOC) environment should consider each learner's abilities, goals, context, and which specific assistive technologies can be used to facilitate the learning experience. Learners with accessibility needs can face difficulties in interacting with MOOCs., Different MOOC platforms and course designs may influence their self-regulated learning skills, learning engagement, and communications with other learners. Unfortunately, MOOC platforms and the pedagogies used in the courses are not fully accessible. Literature has shown that there is a lack of understanding of what learners with accessibility needs can expect from participating in MOOCs. While there are extensive studies of MOOC demographic data, these studies rarely consider the diverse needs of learners. This chapter reports a research study which employed pre- and post-course survey data from 14 Open University MOOCs in the UK's MOOC platform, FutureLearn, (with 29,000 and 5,000 respondents). The analysis of survey data provided preliminary insights and was a source of secondary data as a precursor to interviews with 15 learners who had declared a disability, participated in MOOCs and filled in the course surveys. The data from the semi-structured interviews with MOOC learners helped understand their motivations, the accessibility barriers they experienced, whether/how they worked around those barriers and their suggestions for accessibility solutions. A descriptive approach was applied to analyse the survey data, while a thematic analysis of the interview data was conducted. This research has yielded an understanding of the motivations of learners with accessibility needs when taking part in MOOCs and how MOOCs should be designed to be more accessible.

1.   INTRODUCTION

Massive open online courses (MOOCs) provide opportunities for online distance education. Moreno, Tovar & Cabedo (2018) reported that increasing numbers of learners with accessibility needs are using open educational resources (OERs) such as MOOCs. In that sense, MOOCs in higher education (HE) appear to be converging to support innovative learning experiences such as blended learning, including flipped classroom (Iniesto et al., 2021).

Over 900 universities have launched at least one MOOC, and the total number of MOOCs that have been run stands at 13,500 in 2020 (Shah, 2020), reaching 220 million learners in 2021 (Shah, 2021). The COVID-19 pandemic has enhanced interest in online education, particularly OERs and MOOCs (AlQaidoom & Shah, 2020). However, literature has shown that there is a lack of understanding of what learners with accessibility needs expect from participating in MOOCs. Studies that have reported demographic data in MOOCs (Ingavélez-Guerra et al., 2020; Zhang et al., 2020) did not include data for MOOC learners with accessibility needs.

MOOCs require a significant commitment to self-regulated learning (Handoko et al., 2019). Even with the increase of interest in online education, the technologies used in MOOC platforms and the pedagogies used in courses are not necessarily accessible. Consequently, learners with accessibility needs can face difficulties in interacting with MOOCs, and different platform features and course designs may influence their self-regulated learning skills, engagement, and ability to communicate with other learners (Iniesto, 2020). An accessible MOOC environment needs to consider each learner's abilities, learning goals, where learning takes place, and which specific devices can be used to facilitate the learning experience.

This chapter reports a research study which employed pre- and post-online survey data from 14 Open University (OU) MOOCs in the UK-based platform, FutureLearn, and interviews with 15 learners who had reported disabilities, participated in MOOCs and filled in the course surveys. The OU is the founder of FutureLearn and was an early developer of MOOCs for the platform. We report findings on the motivations

of learners with accessibility needs when taking part in MOOCs and derive recommendations on how MOOCs should be designed to be more accessible.

2. BACKGROUND

Research has highlighted issues with MOOCs, including the low engagement of learners undertaking MOOCs and the high dropout rates (Zhu, Bonk & Doo, 2020). It is difficult to know the accurate number of learners taking part in MOOCs (Li, 2019). However, the definition of success needs to relate to the learner and finishing the MOOC is not necessary the goal for all learners (Liyanagunawardena, Parslow, & Williams, 2017). The motivations of online learners are diverse. Some learners at university level show particular interest in *"having a full-time job"* (Ilgaz & Gulbahar, 2017) while using online environments for social interaction or leisure (Serdyukov & Serdyukova, 2015).

Research on learners' perspectives of participating in MOOCs includes Littlejohn et al. (2016), who found via surveys and interviews that learners' motivation differed depending on their self-regulated learning experience. Shapiro et al. (2017), in a similar mixed methods approach with two MOOCs, suggested the educational background of the learners influenced their motivation and frustration. Watted & Barak (2018) showed that a substantial number of the learners who completed their MOOC were looking for *"career development"* and *"personal and educational benefits",* but motivations differ depending on demographic factors such as age, personal aspects, and affiliation to a university. Sablina et al. (2018), in a sample of 30 MOOC learners, found inconsistencies between the measures of success used by platforms providers and the views of learners, who placed value on acquiring *"new knowledge"*, *"increased self-confidence",* and *"social connections"* rather than on course completion or certification. FutureLearn has devised three archetypes to classify its learners: *"work and study"*, *"personal life",* and *"leisure"* (Walker, 2018). These studies show that MOOC learners are diverse and have different motivations, and completion is not the aim of all learners.

The inclusion of motivations of learners with accessibility needs has been investigated via survey data by Liyanagunawardena & Williams (2016) with older learners, indicating MOOCs can help tackle loneliness. Uchidiuno et al. (2018) conducted interviews and surveyed learners who were studying English as a second language (ESL), showing their need for individualised/personalised tools. While research by Liu, Kang, & McKelroy (2015) did not focus on accessibility, the authors highlight the importance of good MOOC design because difficult navigation and an unintuitive interface negatively affected the learning experience and perception of the course. In the same sense, Park, Jung, & Reeves (2015) reinforce the idea that MOOCs can be a challenging experience and should be as flexible as possible (e.g., making more time available) to meet the diverse needs of learners.

The pedagogical and visual design of MOOCs, their information architecture, usability, and interaction design could have a negative impact on learners' engagement (Liyanagunawardena, Parslow, & Williams, 2017). There are barriers such as limited access to the Internet for some learners and use of the language that can affect the learners' experience (Sanchez-Gordon & Luján-Mora, 2015).

The study presented in this chapter builds on this literature by providing an understanding of the motivations of learners with accessibility needs when taking MOOCs and how MOOCs should be designed to be more accessible. It was designed to elicit the perspectives of learners towards answering the following research questions (RQs):
   • RQ1. What are the motivations of learners with accessibility needs when taking MOOCs?
   • RQ2. How can MOOCs be made accessible for learners with accessibility needs?

This study is part of a broader programme of research that investigated the state of accessibility in MOOCs from multiple perspectives (Iniesto, 2020). The other studies included interviews with MOOC providers (Iniesto et al., 2022) and an accessibility audit that involved evaluating MOOCs on major platforms of MOOCs (Iniesto et al., 2019).

3. METHODOLOGY

The two research objectives in this study that have influenced the design of the study, samples and analyses are described in this section.

3.1 MOOC structure

Iniesto & Rodrigo (2016) defined a range of components to be considered for MOOC accessibility:
- **Access to the platform.** Access to the MOOC platform through the registration and sign-in process.
- **MOOC platform**. MOOC components include assignments, discussions, and evaluations.
- **Learner information**. The user profile includes data on learner preferences.
- **Educational resources**. The educational content is available within the platform as educational resources in text-based or video format or outside the platform in social media (i.e., third-party software).

For clarity in this study, the specific structure analysed is based on that found in the FutureLearn platform, which sets out steps that include all the interactions learners perform with a MOOC (FutureLearn, 2017). These steps can include articles (to convey information), discussions, videos, audios, peer reviews, quizzes, tests, and exercises. The derived structure presented in Table 1 was then adapted to consider the other leading providers and their terminology (e.g., forums instead of discussions, assignments instead of exercises) and is influenced by previous research (Iniesto & Rodrigo, 2016). It differentiates platform and course structures, including their definitions. The structure in Table 1 was used to analyse the interview data, as detailed later in this chapter.

Table 1. MOOC structure

General structure	MOOC structure	MOOC components	Definition
MOOC platform	Platform design and access	• Registration and sign in • MOOC search • Personal profile	The design of the platform, the software that hosts the MOOCs and access to it.
MOOC	Course main page	• Homepage • Syllabus	Homepage with learning goals, practical information and the workload schedule
	Educational resource	• Article • Video • Podcast (audio) • Images • Text-based files • Third-party software	All the educational resources that may include articles, videos, podcasts, images, text-based files and third-party software.
	Discussion	• Forum \ Discussion	Forums or discussions which can have their own space or be embedded in the educational resources.
	Assignment	• P2P • Individual assignment	P2P assignments (peer to peer, reviewed between peers) or individual assignments.
	Test and Quiz	• Test • Quiz	Tests are scored and have implications for getting a certificate; quizzes are designed to provide feedback to the learner.

General structure	MOOC structure	MOOC components	Definition
Both	Help	• Support • Helpdesk	Report and feedback on barriers to learning.

3.2 Design of the study

Two sources of data are used in this study: existing standardised online pre- and post-course surveys administered by the OU for OU-developed FutureLearn courses, and interviews with learners. In a mixed-methods research design, the primary data are those of the interviews, while the survey data are secondary data (Creswell & Clark, 2017).

The pre-course survey in FutureLearn was included as a link from a *"thanks for joining"* email learners received when they enrolled on a MOOC, and the post-course survey was included in the *"farewell"* email. Due to the approach of capturing learner IDs, it was not possible to identify the same learners across the two surveys. This aspect has influenced the design of this study as data from the pre- and post-course surveys is not linked for the analysis of surveys. These online surveys were not developed by the research team (the authors of this chapter), and the questions were not designed for the purpose of this research. However, the surveys contained relevant questions for the proposed methodology and have been used (as shown in Figure 1) to:
- Draw initial findings for the RQs.
- Develop a profile and contact learners for the interviews.
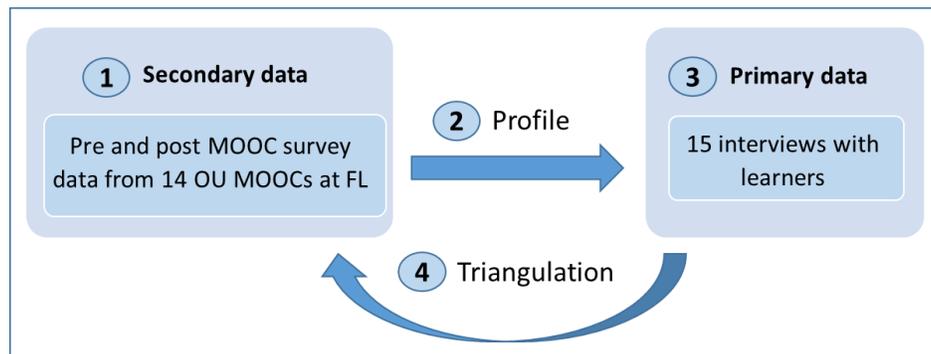- Triangulate the findings from the interviews.

Figure 1. Study design

The approach used to analyse the surveys has been descriptive and comparative between learners declaring and not declaring a disability. Those topics covered in the surveys helped design a profile with basic information to facilitate the following interviewing process. The profile helped design the questionnaires for the interviews and the recruitment of the learners; this approach to recruitment facilitated contacting experienced MOOC learners who self-identified as disabled. As Richardson (2017) indicates, the limitations of grouping all learners with accessibility needs and the need to understand their experiences and attitudes differ. For that reason, the priority was to produce a heterogeneous sample of learners with accessibility needs to be interviewed. The same rationale was used while collecting online survey data from MOOCs across different subjects. Ethical approval for the research was granted by The OU's Human Research Ethics Committee (Application Reference No.: HREC/2017/2451/Iniesto).

3.3 Design of the surveys, sample, and data analysis

The survey design was based on a generic course survey design developed internally by the OU for learner feedback across all its courses. No constructs were considered when the surveys were developed, and no validation work or scoring guidance on the constructs was provided (Neuman & Robson, 2014). The surveys included questions related to disabilities and their educational interests and goals. Disability markers used in this data were based on the ones used for Higher Education Statistics Agency (HESA) reporting at the OU and so aligned with a medical model of disability (that is, it captures impairments rather than functional needs or barriers) (Shyman, 2016).

The pre-course survey had 21 questions, while the post-course had 39. The selection of relevant questions resulted in 11 from the pre-course and 18 from the post-course seen as relevant to the research.
Data was gathered from the Open Media and Informal Learning Unit at the OU. Following Sapsford & Jupp (1996), the sampling method was simple random sampling since it was not possible to know the population beforehand. A large sample size was used to allow the representation of different groups.
The sample included 14 MOOCs from 2013-2015 and covered a range of HESA subjects. Table 2 shows the information disaggregated by MOOCs. In all courses, the number of learners who completed the post-course survey is smaller than the pre-course survey.

Table 2. Pre-and post-course survey participation

Name of MOOC	HESA	Pre-Course Survey			Post-Course Survey		
		Total	RR	%DD	Total	RR	%DD
Basic Science Understanding Experiments	Physical Sciences	804	11.6%	20.9%	163	2.4%	13.3%
Elements of Renewable Energy	Physical Sciences	974	14.3%	11.3%	150	2.2%	11.6%
Get Started with online learning	Education	1668	19%	15.7%	280	3.2%	15.2%
Introduction to Cyber Security	Computer Sciences	6,065	24.9%	9.9%	1,049	4.3%	9.4%
Introduction to Ecosystems	Biological Sciences	734	6.5%	12.1%	240	2.1%	13.1%
Learn to code for data analysis	Computer Sciences	3,454	17.5%	7.6%	158	0.8%	8.8%
Managing My Money	Mathematical Sciences	1,401	9.1%	12.4%	394	2.6%	13.1%
Moons	Physical Sciences	1,251	15.5%	12.2%	935	11.6%	11.8%
Smart Cities	Architecture, Building & Planning	1,020	12.7%	2.9%	137	1.7%	5%
Start Writing Fiction	Creative Arts & Design	5,215	20.2%	16.0%	714	2.8%	14.2%
The Business of Film	Business & Administrative Studies	977	10.7%	9.6%	240	2.6%	8.3%
The Lottery of Birth	Historical & Philosophical Studies	1,426	23.5%	7.3%	96	1.6%	13.5%
The Science of Nutrition	Medicine & Dentistry	2,813	14.9%	12.0%	702	3.7%	10.5%
Understanding Musical Scores	Creative Arts & Design	1,631	24.8%	14.0%	371	5.6%	12.8%
Total		**29,433**	**16.1%**	**12.2%**	**5,629**	**3.4%**	**11.3%**

Note: RR=response rate, DD= Declared disability

The response rates are in line with those found in the literature on MOOCs (Liyanagunawardena & Williams, 2016). The large discrepancy in pre- and post-course survey response rates is symptomatic of the high MOOC dropout rates (Zhu, Bonk & Doo, 2020).

In the sample, the presence of female learners was greater in those who declared disabilities (versus those who do not) (58.9% vs 52.3%) and those over 45 years old, particularly those who were ages 56-65 (21.4% vs 15.8%) and over 65 (13.9% vs 10.2%). Those learners who declare disabilities more commonly had a school-leaving qualification (8.0% vs 6.4%) and college diploma (17.6% vs 13.0%) as their highest qualification, with lower proportions having an undergraduate degree (31.9% vs 33.9%) and postgraduate or doctorate (22.4% vs 32.1%) than the rest of the population. Regarding the employment status, there was a significant difference between those learners declaring a disability reporting lower percentages in full-time employment (28.1% vs 51.6%) but higher levels of retired (22.4% vs 15.9%). This proportion could be related to the predominance of mature learners with declared disabilities.

Table 3 indicates the sample of learners declaring a disability in the pre-course survey disaggregated by categories of disability. The number of disabilities totalled a percentage of cases of 176%. This number reflects that many learners declare more than one disability. The most declared disabilities are fatigue or pain, restricted mobility, and unseen disabilities. The sample shows alignment with the OU 2020\2021 students who have disclosed disabilities population in fatigue (13.5%), learning difficulties (13.9%), and unseen disabilities (12.29%) but less representative of the population disclosing mental health (32%).

Table 3. Categories of disability in percentage

Categories	
Partially sighted	3% (181)
Hard of hearing	8% (462)
Restricted mobility	17% (1050)
Restricted manual skills	6% (363)
Impaired speech	1% (88)
Learning difficulties	10% (643)
Mental health difficulties	13% (790)
Personal care support	2% (147)
Fatigue or pain	18% (1077)
Unseen disabilities	15% (902)
Autistic spectrum disorder	3% (196)
Other disabilities	4% (241)

As noted previously, the online surveys were not designed with constructs that allow building correlations between questions. Therefore, the analysis is descriptive. It shows the total number of answers and column percentages of positive responses for the total of all learners, learners who declare a disability, and learners who do not declare a disability. Pearson's Chi-Squared test of independence is added in a column to show the association between the variables applying Phi and Cramer's V nominal association. The response levels are compared in percentages between the two groups of learners, where * indicates significance at $p<0.01$ using a z-test for its convenience between pairs of means (Calder, 2006).

3.4 Design of the interviews

As explained earlier, learners across 14 MOOCs responded to the same pre- and post-course surveys. Those completing these surveys were asked to self-identify whether they had any disabilities. The topics covered helped to design a profile with basic information to simplify the interviewing process and to design the questionnaire for those learners who were approached for interviews. The profile included three main areas:

(1) *"demographic information and areas of interest"* (sourced from both surveys), (2) *"location and previous experience"* (pre-survey), and (3) *"devices, motivation, learning experience and feedback"* (post-survey).

For the design of the interviewing process, a Person-Centred Planning (PCP) approach has been used (Wilson et al., 2016), which allows learners to choose their preferred way to communicate with the support of epistolary interviews (Debenham, 2007). Three steps were designed to support that flexibility:
1. **Profile**. Learners' responses from the surveys were collected to help the research team profile the learner and prepare for the following steps.
2. **Pre-questionnaire**. Learners were contacted, and once they agreed to be interviewed, two steps were followed: an online questionnaire and a semi-structured interview. The pre-questionnaire was the procedure to collect all the information missing from the profile and conveniently conduct the interview in the shortest time possible, allowing learners to avoid a long and stressful interview. The pre-questionnaire was using an online survey.
3. **Semi-structured Interview**. The pre-questionnaire included the consent form and that allowed the learners to indicate if the interview would be conducted via an online survey or a Skype interview.

Therefore, for the interview, we had information to build a set of questions based on the research questions. The interview protocols were run in pilots with five researchers to clarify the order and complexity of the questions (Castillo-Montoya, 2016). The interviews were designed to be focused on three main themes over about 30 minutes:

- **Learners' motivations when participating in MOOCs** (RQ1). The different types of motivations.
- **Accessibility and daily work: current state and improvements**. (RQ2). Accessibility barriers found and how learners reacted to them.
- **MOOCs and adaptation** (RQ2). The way learners would like to have accessibility information provided in MOOCs and the content and platform to be adapted to their needs.

3.4.1 Sample

Learners from the most recent data were given priority in identifying potential participants. Therefore, the focus was on the survey respondents who participated in the last 8 presentations on MOOCs. The three criteria to get a diverse sample are aligned with the RQs:
1. **Declared disabilities.** Cover a range of different declared disabilities in the sample.
2. **Demographical background.** Include in the sample different ranges of age, educational qualification, and employment status.
3. **Previous experience.** Capture different experiences with providers other than UK's FutureLearn.

A cluster sampling approach was used during the recruitment in two different phases (Sapsford & Jupp, 2006). A joint group of 56 pre- and post-common learners participated in both surveys, and 31 were contacted following the previous criteria, from which eight completed the process. These eight interviews formed the first phase. The research team indicated the missing experiences and voices from these interviews and their transcription. For example, the sample was overrepresented by learners over 56 years and those *"retired"* or *"not able to work"*.

For the second phase, from those learners who only answered the pre-course survey, 142 (meeting the criteria to cover the missing voices) were contacted, of which five completed the process. Of those who only answered the post-course survey, 14 were contacted, and two of them completed the interview.

Considering the sufficient information that was gathered and the complexity of finding new participants, the sample was closed with 15 learners interviewed. The process took place from May to September 2017. Names and identifying information were anonymised by applying a random pseudonym to each participant. Table 4 shows the sample disaggregated by disabilities; the Table shows the percentages within the sample, where 10 learners reported more than a disability (a total of 29 declared). Unseen disabilities represent a higher percentage, followed by restricted manual skills and fatigue or pain. These three disabilities are consistent with the survey data previously disclosed.

Table 4. Sample disaggregated on disabilities

	Partially sighted	Hard of hearing	Restricted mobility	Restricted manual skills	Learning difficulties	Personal Care Support	Mental health	Fatigue or pain	Unseen disabilities
Alexia									✓
Celia					✓				
David									✓
Deborah									
Gemma						✓		✓	✓
Jodie			✓	✓			✓		
Laura									✓
Lorraine				✓	✓			✓	✓
Martha	✓		✓	✓				✓	✓
Matthew							✓		
Natalie							✓	✓	
Rebecca					✓				
Simon			✓	✓					✓
Sylvia		✓							
Veronica	✓	✓							
Total disabilities (29)	6.9% (2)	6.9% (2)	10.3% (3)	13.8% (4)	10.3% (3)	3.4% (1)	10.3% (3)	13.8% (4)	24.1% (7)

Regarding the two other variables used for recruitment, Table 5 shows that "*school-leaving qualification*", *"postgraduates",* and *"undergraduates"* (26.6% each) are the most represented. Learners in the sample are mostly *"full-time employed"* or *"not able to work"*. The largest group in age are those between 36 and 45 (46.6%). In the set of participants, we found that after FutureLearn, Coursera was the MOOC platform most used. Other variables that have not been primary for the recruitment process show the difficulty of keeping a balanced sample when prioritising some variables. The sample is biased towards 80% female and the predominance of UK-based learners (80%) and use of English as their mother tongue (93.3%). The preference to participate in the interview was text-based (60%).

Table 5. Sample disaggregated by age, education, employment, experience, gender, country\language, and interview type

	Age	Educational qualification	Employment status	MOOC platform experience	Gender	Country Language	Interview
Alexia	36-45	Postgraduate	Full-time employed	FutureLearn, Coursera, edX, Others	Female	France\ESL	Text-based
Celia	36-45	College diploma	Full-time employed	FutureLearn, Coursera	Female	UK\English	Text-based
David	36-45	SL qualification	Full-time employed	FutureLearn	Male	UK\English	Text-based
Deborah	56-65	SL qualification	Full-time carer	FutureLearn	Female	UK\English	Text-based
Gemma	36-45	Postgraduate	Not able to work	FutureLearn, Coursera, Stanford Online, edX, NovoEd, Canvas, Open2Study	Female	UK\English	Text-based
Jodie	36-45	Postgraduate	Unwaged	FutureLearn	Female	UK\English	Audio
Laura	36-45	SL qualification	Full-time employed	FutureLearn	Female	UK\English	Text-based
Lorraine	46-55	Postgraduate	Not able to work	FutureLearn	Female	UK\English	Text-based
Martha	56-65	Undergraduate	Not able to work	FutureLearn, Others	Female	USA\English	Audio
Matthew	36-45	SL qualification	Unwaged	FutureLearn, Coursera, edX, Open2Study	Male	UK\English	Audio
Natalie	56-65	Undergraduate	Not able to work	FutureLearn, Coursera, Udemy, Others	Female	UK\English	Audio
Rebecca	26-35	Undergraduate	Full-time employed	FutureLearn, Others	Female	UK\English	Text-based
Simon	65 +	No qualification	Retired	FutureLearn, Coursera	Male	Australia\English	Audio
Sylvia	65 +	No qualification	Retired	FutureLearn	Female	UK\English	Text-based
Veronica	65 +	Undergraduate	Retired	FutureLearn	Female	UK\English	Audio

3.4.2 Data analysis and validation

Complete transcripts of the interviews were produced from verbal data taken from the recorded audio. An intelligent verbatim transcription approach has been used, followed by an edited transcription to provide the quotes used in the text written in British English for readability and consistency. The analysis followed Braun & Clarke's (2006) six phases of thematic analysis as it is shown in Table 6. Printed copies of the transcripts and NVIVO software were used to support the analysis. Each iteration was developed from the previous analysis. In this case, the process had three levels of depth for the themes, representing an interpretative level approach.

Table 6. Thematic analysis iterations

Phase	Iterations
1. Familiarising with the data	1
2. Generating initial codes	2
3. Searching for themes	2
4. Reviewing themes	2
5. Defining and naming themes	2
6. Producing the report	1

The two iterations detailed are:

- **First iteration.** All 15 interviews were analysed from the beginning. Themes and sub-themes have been obtained using an inductive perspective to understand the richness of the information provided by the learners. These themes have been structured over the two pre-established deduced main themes related to the research questions: "*Learner's motivations*" while participating in MOOCs (RQ1) a*nd "Accessibility in MOOCs"* (RQ2) with three themes *", Accessibility barriers and*

enablers", *"Response to accessibility barriers"* and *"Solutions proposed to accessibility barriers"*. The analysis generated 39 sub-themes.

- **Final iteration.** A final iteration of thematic analysis was based on the first and is represented in Figure 2, including the counts of themes and sub-themes. The research questions drove an intensive exercise to reduce the sub-themes from the first iteration. The result is 4 sub-themes for the *"Learners motivations"* and 5 sub-themes for the *"Accessibility in MOOCs"* following the previously defined *"MOOC structure"*.
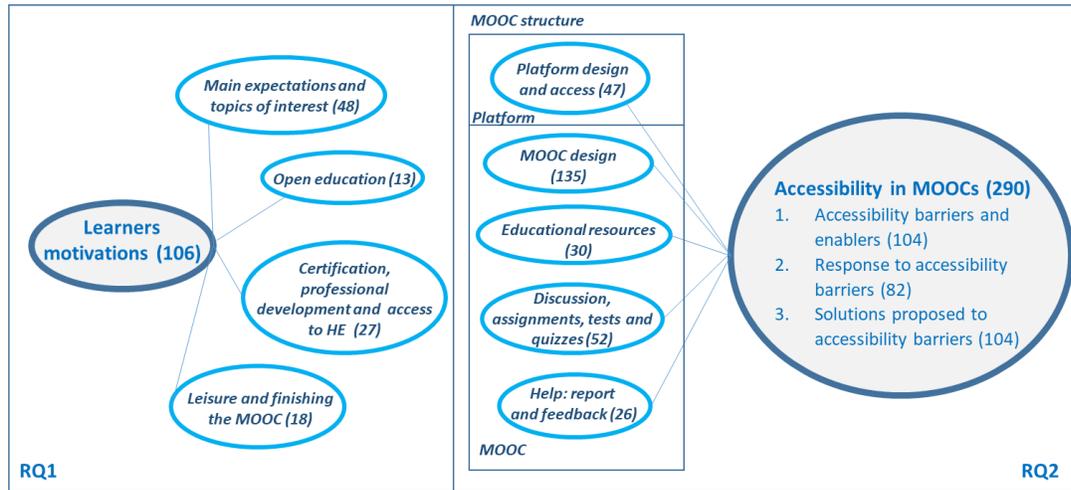

Figure 2. Thematic map representing the themes and sub-themes at the final iteration

Two of us followed an inter-rater reliability process to validate the semantics of the final iteration. This involved 94 quotes (11.45% of the data set) and 3 possible answers randomised across the sub-themes. The agreement was substantial, with a Cohen's Kappa of 0.79 (Table 7). The coverage is as per percentage in the literature (between 10% and 15%) (Strijbos & Stahl, 2007).

Table 7. Cohens Kappa for the final iteration validation

	Value
Relative observed agreement	80/94
Hypothetical probability	1/3
Cohens Kappa	0.79

As detailed previously, following a mixed methods research design, survey data is secondary data for general insight to define learners' motivation and accessibility aspects. The primary data are those from the interviews.

4.   RESULTS

In this section, the results are described as per the research questions. Relevant survey data, alongside example quotes from the analysed interview data, are detailed in tables.

4.1   Motivations of MOOC learners with accessibility needs

Data from the surveys indicate that the motivation for studying MOOCs is usually driven by the personal interests of learners with accessibility needs (88.2.%) (see Table 8). However, they are also more likely to

be studying MOOCs to find out if they can study at the HE level and prepare themselves for future study (12.5% and 20.8%). These interests may be related to the use of MOOCs to access HE and because these courses are free (45.9%). Learners with accessibility needs have experience in taking online courses for university credit (30.4%) and continuing professional development (CPD) (29.6%). They are highly motivated when participating in MOOCs (38.3%).

Table 8. Interests, experience, and motivation in MOOCs – Quantitative results

Why are you interested in studying this course?	%Total	% DD	% NDD	Pearson X-2
Personal interest	85.2%	88.2%	84.8%	23.4*
Professional development	39.1%	29.9%	40.2%	139.9*
Relevant to my work	26.8%	19.2%	27.8%	112.1*
Relevant to my current studies	11.5%	12.7%	11.4%	4.7
To prepare me for future study	17.1%	20.8%	16.6%	35.4*
To find out if I can study at this level	8.3%	12.5%	7.7%	88.9*
To find out more about MOOCs	11.4%	13.4%	11.1%	14.4*
The course was free	38.4%	45.9%	37.5%	86.6*
To try out learning online	22.1%	26.0%	21.7%	31.6*
To learn more flexibly around my other commitments	22.0%	25.1%	21.6%	20.2*
Total	**29,303**	**3,324**	**25,979**	
What sort of online course have you taken?	**%Total**	**% DD**	**% NDD**	**Pearson X-2**
An online course for continuing professional development	33.5%	29.6%	34.0%	11.3*
A MOOC	65.1%	64.3%	65.2%	.03
An online course for university credit	23.3%	30.4%	22.4%	72.9*
An online course based around OER	18.4%	23.9%	17.7%	53.4*
Total	**19,671**	**2,268**	**17,403**	
Which phrase best describes your approach to the course	**%Total**	**% DD**	**% NDD**	**Pearson X-2**
I was highly motivated	33.1%	38.3%	32.4%	8.7*
I was motivated	51.7%	46.9%	52.3%	7.3*
I was motivated some of the time	12.4%	11.0%	12.6%	1.2
I struggled to stay motivated	2.5%	3.7%	2.3%	4.9
I wasn't really motivated	.4%	0%	.4%	2.7
Total	**5,520**	**671**	**4,849**	

Note: DD=declared disability, NDD=non-declared disability, *statistical significance

Data from interviews corroborate that learners' motivations depend on their previous learning experience (Table 9):

- **Main expectations and topics of interest**. There is a general commitment that learners are primarily motivated by the subject matter of the MOOC they choose. MOOCs represent a friendly online environment compared to face-to-face educational experiences and offer a broad number of subjects to be studied at their pace. For some learners participating in MOOCs, it could be their first experience with online learning. MOOCs enable learners with accessibility needs to access MOOCs on their personalised devices and learning environment (home, workplace, etc.), which helps develop self-confidence for study.

Table 9. Motivations in MOOCs – Qualitative results

Theme	Sub-theme	Sample quotes from the analysed data
Learners' motivations	Main expectations and topics of interest	I gained an interest in MOOCs and how many different platforms and subjects you can access them from (…). They give time for your brain to be stimulated and give you the opportunity to challenge yourself. (Rebecca)

Open education	I do not have much money available so free courses are wonderful. Also, with the fact I often can't finish a course on time or must leave it, paid courses are too much of a risk financially. (Gemma)
Certification, professional development and access to HE	I think employers would look at them, I know it is not a qualification, but it is a certificate that shows that you have that skill and that you have completed certain tasks and achieved certain skills. (Jodie)
Leisure and finishing the MOOC	I needed a mental outlet and something I could do at home. The FutureLearn was just what I needed, short and challenging, with a huge variety of courses and the chance to choose topics. (Deborah)

- **Open education.** The affordable cost of MOOCs opens up opportunities for a basic understanding of topics as *"tasters"* MOOCs challenge learners with new educational stimulations. Free MOOCs allow access to learning for low-income learners and benefit everyone by facilitating personal development through high-quality educational materials.
- **Certification, professional development, and access to HE.** Some learners report that MOOCs play a decisive role in their personal and professional development. In that sense, learners report that MOOCs are useful for CPD and that the certification can add value to their curriculum. This achievement can demonstrate an employer's ability and interest in self-sufficiency in education. For that purpose, MOOCs need to be comprehensive enough to count for certification, and certificates should provide detailed information on the learning that has been achieved.
- **Leisure and finishing the MOOC.** Finally, some learners enjoy taking MOOCs for leisure, keeping their minds active, and enjoyment.

4.2   Making MOOCs accessible for learners with accessibility needs

Survey data shows that learners with accessibility needs predominantly take MOOCs at home (96%), implying that they will use their own devices. Laptops and desktop computers are the primary devices used (44.5%, 37.7%) (Table 10).

Table 10. Location and main device – Quantitative results

Where do you expect to do the course?	%Total	% DD	% NDD	Pearson X-2
At work	19.0%	12.2%	19.9%	112.9*
At school / college / university	4.9%	3.5%	5.1%	16.4*
At home	94.6%	96%	94.4%	11.18*
In a public place	9.6%	10.8%	9.4%	6.1
While on the move	8.7%	7.4%	8.9%	7.7*
Total	**29,229**	**3,314**	**25,915**	
Which devices did you use to study the course?	%Total	% DD	% NDD	Pearson X-2
Tablet	15.4%	20.0%	14.7%	136*
Desktop computer	37.6%	37.7%	37.6%	13.6
Smartphone	3.6%	3.8%	3.6%	1.1
Laptop	48.8%	44.5%	49.4%	7.7
Total	**5,577**	**681**	**4,896**	

The richness of interview data helps understand how to make MOOCs more accessible. The theme *"accessibility in MOOCs"* provides a multilevel perspective where *"barriers"* show the current state and *"responses"* and *"solutions"* involve the identification and addressing of barriers (see Table 11). Barriers, responses to those and solutions by learners identified in this study are summarised in Table 12, with the practical responses that could be implemented shown in italics. The *"MOOC structure"* (see Table 1 and Figure 2) is used to report the findings:

- **Platform design and access.** Learners interact with different MOOC platforms, and their different designs influence their behaviour. Difficulties in achieving a task on the platform increase learners'

anxiety. Learners face barriers using different browsers and devices or updating information after registration. Language is a barrier for those learners accessing them in a second language. To address those barriers, MOOC platform design should be as simple as possible and support several languages for usability. Platforms should add profiling options to allow learners to set up their default configuration and get recommendations on which MOOCs better fit their preferences. They should include tools, internal or external, to help learners, for example, dictionaries.

Table 11. Accessibility in MOOCs – Qualitative results

Theme	Sub-theme	Sample quotes from the analysed data
Accessibility barriers and enablers	Platform design and access	If I wanted to change my email address, then I would lose all my courses to date and records. This should be easier to do. (Deborah)
	MOOC design	I have health problems, and there are some weeks when I could get quite a lot in another week when I cannot do very much at all. (…) By the time I can get back to them, I 've kind of lost interest, or I feel so far behind everybody. (Natalie)
	Educational resources	I found once or twice that I could not get the quality of sound, and sometimes I could not get the video in my old equipment. (Veronica)
	Discussion, assignments, tests and quizzes	I did not like critiquing other people's work but let alone them critiquing mine, I do not enjoy that sort of things at all. (Natalie)
	Help: report and feedback	I have very rarely contacted anyone who runs the MOOCs because it is not necessarily a problem with the content - it is a problem with my mental health which they cannot help with. (Matthew)
Response to accessibility barriers	Platform design and access	I use it (Google translator especially). However, the translations are not very good. (Alexia)
	MOOC design	If some weeks this was not possible due to work and other commitments, I would try to do half an hour first thing in the morning before work to make sure I kept on top of the work and did not fall behind. (Rebecca)
	Educational resources	I use the two possibilities at the same time (watching and using subtitles). By acting like this, I try to improve my written and oral comprehension. (Alexia)
	Discussion, assignments, tests and quizzes	I must admit I've always skipped those bits not because I don't think they are worthless, and this is possible because of my depression I suffer from. I don't want people to look at my stuff and tear it to shreds because I have very fragile self-esteem. (Matthew)
	Help: report and feedback	I emailed FutureLearn to complain about the changes to their structure and got a standard reply and a link to an online discussion which had been closed to further comment. (Gemma)
Solutions proposed to accessibility barriers	Platform design and access	I often find myself scrolling through so many different courses to seek out ones that would suit me. Profiling I think is a great idea as it is tailored to you. (Rebecca)
	MOOC design	Detailing that the platform includes transcripts, audio transcripts and other features before a person signs up would be useful. (Gemma)
	Educational resources	I did like to watch the videos because I seem to take more in from a video than if I am reading something. (Jodie)
	Discussion, assignments, tests and quizzes	The tutors cannot mark so many people, they have to rely on us to help them, but I think they should give us clearer directions on marking (Simon)
	Help: report and feedback	I think live chat is useful, particularly as a course commences for help with any technical issues. (Lorraine)

- **MOOC design.** Learners report barriers caused by the workload and the limited time to complete each week. The design is affected by the chronological order of modules. The number of educational resources and assignments per week can be too many, and finding the right balance of time to watch or read the content can be challenging for a learner with accessibility needs. To solve these issues, the information given to learners should include relevant details about accessibility, a detailed syllabus and information about the previous knowledge expected. Other information that should be provided includes the learning goals, the workload, and information about future runs of the course. Platforms should provide access to the entire MOOC content in one go from the beginning and avoid preventing access to the MOOC when the scheduled study period finishes.
- **Educational resources.** In terms of educational resources, the lack of availability of subtitles and transcripts is a barrier for many learners, and so is the language barrier. The lack of accessibility of text-based files and images was also reported. Therefore, educational resources should be provided in alternative formats such as subtitles and transcripts in several languages; transcripts need to be visible when the video is being played. Platforms should add facilities to download the educational resources for low-quality Internet connections.

- **Discussion, assignments, tests, and quizzes.** Not all learners enjoy participating in course discussions. The design of forums sometimes increases the difficulties experienced in finding helpful content. Not all learners enjoy their contribution being reviewed and reviewing assignments by other participants. Learners prefer self-assessment mechanisms such as quizzes that test their understanding and provide feedback, but they are wary of the fixed time limits. Since learners report that some collaborative activities and assignments can cause anxiety, MOOCs should provide alternative learning pathways for those not aiming for certification. MOOCs should provide instructions on how to evaluate assignments when involved with peer-to-peer reviewing. These aspects are a major focus of MOOCs, given the conversational learning / connectivist models underpinning them.
- **Help: report and feedback.** The limited presence of facilitators in MOOCs and the feedback they could provide was a barrier for some learners. To overcome this, guidelines should indicate how to ask for help and report barriers. Several options were asked for, including contact email, *"do it"* request form, use discussions to ask for help, a chatbot and social media. Finally, at the beginning of the MOOC, there should be clear information about how learners can ask for help.

Table 12. Main accessibility barriers, responses, and solutions identified by learners

MOOC structure	Accessibility barriers and enablers	Response to accessibility barriers	Solutions proposed to accessibility barriers
Platform design and access	- Designs across platforms - Registration and sign in - Devices - Offline access - Second Language	- Abandonment *External tools*	- Better and multilingual platform design - Profiling - Offline access
MOOC design	Workload	- Abandonment - Skipping parts - Re-join next run - Self-organisation	- MOOC information - Variety of tools - External links - MOOC structure - MOOC content access
Educational resources	- Videos - Text-based files - Images	*Use of subtitles and transcripts* *External tools*	- Alternative formats for educational resources - Video design
Discussion, assignments, tests and quizzes	Participation	- Abandonment - Skipping assignment	- Optional assignments and tests - Discussion and assignment guidelines
Help: Report and feedback	Facilitators	*Tools: email and do it request*	- Help guidelines - Facilitators - Discussions - Chatbot - Social media

5.   DISCUSSION AND CONCLUSION

The results provide a richer understanding of the motivations and barriers of learners with accessibility needs and how these relate to MOOC design. In this section, we discuss the key findings related to the motivations of learners and the accessibility of MOOCs and discuss the limitations, implications and potential for future work building on the research reported in this chapter.

5.1   Motivations of MOOC learners with accessibility needs

The sample in survey data has shown the difference in employment status between those who declare disabilities and those who do not, which could be due to the higher unemployment rate in those with disabilities, similar to that reported in Powell (2018). Learners' motivations to participate in MOOCs are broad and depend on factors identified earlier, such as improving professional development, leisure, or social interaction (Ilgaz & Gulbahar, 2017; Sablina et al., 2018; Serdyukov & Serdyukova, 2015).

There are several other aspects, following the results detailed in section 4.1, to consider to understand the motivations of learners with accessibility needs: (1) learners with accessibility needs find MOOCs useful for personal development, CPD, and as a route to access HE (Watted & Barak, 2018). (2) they consider the low cost of MOOCs to be an important factor (Al-Imarah & Shields, 2019), and (3) they are interested in the flexibility of accessing MOOCs, studying at their own pace, and opportunities for self-regulated learning (Wong et al., 2019). They feel that MOOCs offer a more friendly environment compared to classroom attendance.

However, there is a risk that such motivations and requirements may no longer be met since low cost and openness are not a priority in the recent business models adopted by the platforms that provide MOOCs (Ruipérez-Valiente et al., 2020). As reported by Shah (2021), the focus of these providers has changed, including the launch of over 500 micro-credentials. These types of courses, even when not massive, can offer focused training for the labour market and promote social inclusion through employability and CPD opportunities (Farrow, 2020). They offer certification and HE recognition, but the increased costs can be a barrier. However, MOOCs, Micro-credentials and other designs may continue to co-exist on these platforms.

5.2   Making MOOCs accessible for learners with accessibility needs

Learners with accessibility needs indicated different strategies they used to cope with accessibility barriers; however, these workarounds were far from the desired solutions. Several key points from the research reported in section 4.2 should be considered for MOOC design and development, following the *"MOOC structure"* previously defined, include:

- **Platform design and access.** For a simpler platform design, the profiling used in OER repositories and recommender systems could benefit from the application of accessibility metadata standards to allow personalisation which matches the varied needs of learners (Iniesto et al., 2021).
- **MOOC design**. Universal Design for Learning (UDL) principles should be considered in MOOC design. They can support providing information to learners, foster inclusion, and widen access (Iniesto, Rodrigo & Hillaire, 2019).
- **Educational resources.** The length of the videos and their design affect the engagement. They should be short and focused on the tasks (Li, 2019).
- **Discussion, assignments, tests, and quizzes.** These types of activities need to be designed carefully, with different levels of difficulty and practising learners' expectations and engagement (Bonafini et al., 2017).
- **Help: Report and feedback**. Research shows the potential benefits of facilitating support, for example, using chatbots to disclose accessibility needs (Lister et al., 2021), which could be helpful considering the limited resources in terms of the availability of educators and facilitators in MOOCs.

5.3   Contributions, limitations, and future work

MOOCs can be seen as a significant change in online learning, offering the public a vast supply of free-to-access courses. MOOCs offer an opportunity for broadening participation. For instance, research shows

that there are benefits for learners regardless of their background due to the low or no-cost model (Iniesto et al., 2022). Learners who disclose a lower socioeconomic background or a disability are more likely to report the benefits of participating in MOOCs for CPD and social interaction (Padilla et al., 2020). Certain projects have also considered using MOOCs in CPD, where MOOCs have been used for training in the Global South (Cerniewicz et al., 2017). These different initiatives have demonstrated the role of MOOCs in expanding free access to online courses supporting some of the early hopes that MOOCs would provide a life-changing opportunity to facilitate equity, diversity, and inclusion values in education (Rao et al., 2015).

MOOCs reach global audiences and should consider all potential learners who might otherwise be left behind. Because of this, MOOCs really should be accessible to all learners, with attention paid to diversity as a social imperative (Barrera et al., 2017). To make MOOCs more accessible, processes must be implemented to identify barriers, strengthen mechanisms that involve learners' participation in MOOC design and facilitate agile responses in addressing barriers (Iniesto, 2020).

One limitation in this research is the use of data from surveys were not designed by the research team. These were also designed with a lack of constructs limiting the scope for clustering of responses and identifying correlation factors in terms of how gender, age, and location influence disabilities. MOOC learners who filled in the post-course survey may have shown biased satisfaction since they had finished the MOOC (Pursel et al., 2016).

The set of 15 learners who were interviewed was considered to have a degree of representativeness, given their diverse backgrounds, disabilities, and answers. However, it is acknowledged that the sample has limited scope to represent the diversity in society. Different recruitment criteria could be used to complement the sample, for example, to consider the age and gender of learners. The criteria used also focus on experienced MOOC learners who had completed the courses and, as such, could have missed experiences and issues faced by unsuccessful or disengaged learners. Future work could focus on case studies with specific and individual accessibility needs to understand them in-depth. Such an approach would avoid medical models of clustering learners who declare a disability and support the perspective of "*putting people and processes first*" (Cooper et al., 2012).

The contribution of the research presented in this chapter has identified that MOOCs require accessible platforms and course activities to fully open up access to education in the future. As reported in the results and indicated with suggestions in section 5.2, to achieve this, MOOCs need to include a range of accessible educational resources and offer options for learners to set their own goals. They should give clear guidance to facilitate collaboration in discussions and assignments, provide feedback in quizzes, and operate better processes to give help. Personalisation options will be required to achieve this flexibility. That way, MOOC learners can adapt their learning environments to their individual needs.

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AUTHOR INFORMATION

Francisco Iniesto is a Research Associate and Associate Lecturer at the Institute of Educational Technology at the Open University, UK. His areas of research and publications are inclusive design, accessible educational technology, and open education. His background is as a Computer Engineer with extensive experience in IT consulting and software development.

Patrick McAndrew is an Emeritus Professor of Open Education at the Institute of Educational Technology in The Open University, UK. He has played a leading part in developing approaches to open and free learning. Recent projects in this area include OpenLearn, OLnet, Bridge to Success, and the OER Research Hub. These projects combine practice and research on the impact of openness.

Shailey Minocha is a Professor Emerita of Learning Technologies and Social Computing at The Open University, UK. Shailey has expertise in the pedagogical design and usability evaluation of digital learning environments for online learning and continuing professional development. Her recent projects have involved investigating the role of immersive technologies such as virtual reality and augmented reality in education and training and for social impact.

Tim Coughlan is a Senior Lecturer at the Institute of Educational Technology at The Open University, UK. His research crosses the areas of Education and Human-Computer Interaction. He is particularly focused on designing and evaluating systems that support inclusion, creativity, and openness in learning.