

Culturally adaptive learning design

A mixed-methods study of cross-cultural learning design preferences in MOOCs

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8.1 Introduction

Over the past decade, open online learning environments have changed the educational landscape all around the world. Increasingly, formal degrees are taking a hybrid form or being replaced by digital literacy products, such as Massive Open Online Courses (MOOCs) (Shah, 2019). MOOCs, as large-scale, freely accessible learning environments, are primarily recognized for their potential to facilitate universal learning access, as previously identified in Chapters 5 and 6 (Chua, 2022; Conde Gafaro, 2022). A learner can learn from these courses as long as they have access to appropriate resources such as a computer, laptop or mobile device and an adequate internet connection (Jansen & Schuwer, 2015). Still, emerging data suggest varied persistence and achievement gaps for learners from various regions (Reich & Ruipérez-Valiente, 2019). In contrast to the expectations of MOOC enthusiasts (Bozkurt & Aydın, 2018; Jansen & Schuwer, 2015), there is substantial inequality and disparity in the global digital learning landscape, with regional and cultural backgrounds influencing the way learners engage with MOOCs (Guo & Reinecke, 2014; Kizilcec & Halawa, 2015; Kizilcec et al., 2017; Ogan et al., 2015; Reich & Ruipérez-Valiente, 2019).

The way MOOCs are designed – in short learning design (LD) – can substantially influence learners' persistence in MOOCs. Typically, in MOOCs this entails various types of learning activities, offered in a predetermined order. Recent literature suggests that a centralised LD containing prearranged, fixed number of activities, may not work for all learners (Bearman, Lambert, & O'Donnell, 2021). Additionally, LD and other pedagogical factors (e.g., teaching methods and content) may have a predictive and causal link with learners' progression and whether (or not) they stay in the course (Xing, 2019; Guo, Kim, & Rubin, 2014). However, there is limited focus on how and to what extent the influence of LD varies with geo-cultural contexts. Previous work suggests that various geo-cultural groups have a distinct preference for particular learning activities, but the research is limited on the ways to adapt and tailor LD accordingly (Joksimović et al., 2017). The overall results from this research helped us to understand the association between learning activity types and learners' persistence in MOOCs. In Chapter 8 we will explore how such association varies between geo-cultural contexts.

8.1.1 Learning design and learning behaviour

The critical role of pedagogical factors, such as LD, in learner persistence has been widely acknowledged in formal learning environments (Nguyen, Rienties, & Toetenel, 2017; Rienties & Toetenel, 2016; Rienties, Nguyen, Holmes, & Reedy, 2017) as well as in MOOC learning environments (Rizvi, Rienties, Rogaten, & Kizilcec, 2020; Xing, 2019). In Chapter 8, we conceptualise LD as a course development process, i.e., a process of designing a series of learner-facing activities. The process produces a course as a sequence of learning activities of different types (e.g., reading material, instructional audios, videos, and discussions). The designed activities can be reused when needed. To the best of our knowledge, MOOC learning designers tend not to modify or adjust the course LD once the course has been offered. Few studies have examined learners' interaction with MOOC learning resources, specifically with various content types, for example, text-based resources (Rizvi et al., 2020; Uchidiuno, Koedinger, Hammer, Yarzebinski, & Ogan, 2018), instructional videos (Davis, 2019; Guo et al., 2014), course assessments (Juháák, Zounek, & Rohlíková, 2017; Li & Baker, 2018), and participation in discussion forums (Allon, Van Mieghem, & Zhang, 2016; Sunar, White, Abdullah, & Davis, 2016; Yang, Sinha, Adamson, & Rosé, 2013), as also indicated in Chapter 6 (Chua, 2022). Recent work suggests that a centralised LD containing a fixed number of sequenced learning resources may be convenient and even be beneficial for most learners, but this does not guarantee that it will be useful for all learners (Bearman et al., 2021; Margaryan, Bianco, & Littlejohn, 2015).

In Chapter 8, we leveraged FutureLearn MOOCs as a primary source of data, where the basic course element in LD is called a *step*. This step represents a learning activity in a MOOC and could be of several types: Article, Discussion, Peer Review, Quiz, Text, Video/Audio, Exercise (Sharples, 2015). The content and structure are designed in accordance with the course needs and then activities are grouped together in a sequence. A title is used to describe the overall learning objective of that group. As illustrated in Figure 8.1, most FutureLearn MOOC designs primarily contain four types of activities; Articles, Videos, Discussions and Quizzes (Sharples, 2015).

For the learning activity categorisation, we used the OULDI theoretical framework (Cross, Galley, Brasher, & Weller, 2012), which is further described in Chapter 14 (Nguyen, Rienties, & Whitelock, 2022). According to the OULDI framework, reading articles or watching videos are referred to as assimilative activities, i.e., learning activities to develop, process, and attain information in an online course. Next, discussions are categorised as communication-based activities which allow learners to participate in course-related discussions. It is important to highlight here that although discussion-steps are considered an integral part of LD, FutureLearn MOOCs also offer a commenting space underneath every learning activity that comprise a social media-style feed. In the commenting space, a learner can start, like or comment on a discussion or follow their peers and instructors (Sharples, 2015). The FutureLearn platform explicitly embeds discussions in the LD of all courses and aims to make MOOCs a *social learning space*

Week 1: Introduction & General Theory

An overview of important background concepts and theory. This will provide the framework for you to locate the various algorithms and methods we look at in the remaining weeks.

[Edit week](#) [View week](#)

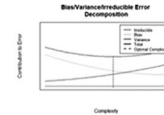
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Introduction (3 steps)	X
Data Science Workflow (2 steps)	X
Types of Learning (3 steps)	X
Linear Models, Non-Linear Models & Feature Transformations (3 steps)	X
Expected Loss, the Bias-Variance Decomposition & Overfitting (4 steps)	X
Statistical Models, Loss Functions and Training as Optimization (3 steps)	X
Regularization (5 steps)	X
Week One Wrap Up (2 steps)	X

Expected Loss, the Bias-Variance Decomposition & Overfitting

We examine the idea of the expected loss of a statistical model, look at the bias-variance decomposition of expected loss and discuss the relation of this to overfitting.



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1.12	Expected Loss, the Bias-Variance Decomposition & Overfitting	AR	👁
1.13	Bias-Variance	VI	👁
1.14	Do you understand: Bias, Variance & Overfitting	QU	👁
1.15	Discussion on Expected Loss, Bias-Variance and Overfitting	DI	👁

Figure 8.1 An overview of one set of activities in a FutureLearn MOOC.

(Manathunga, Hernández-Leo, & Sharples, 2017). Finally, assessment activities such as Quizzes were taken into consideration, as the role of assessments is widely recognised as critical to the learning and engagement. We have been specifically focussing on these four main learning activity types.

This research was driven by the motivation that limited research has explored how different proportions of the various learning activity types (i.e., reading material, videos, quizzes and discussion-based activities) can be potentially linked with MOOC learners' persistence, and that most of the existing research fails to address learners' perceptions about these activity types. Ideally, there are several pedagogical factors that can be made flexible and modifiable either midway or between course runs. These factors include learning activity types, sequence of those activities, and content difficulty level. Therefore, it is imperative to understand how learners' persistence is linked with these learning activities in a course and then unpack the learners' perspectives about these activities.

8.1.2 Geo-Cultural background and learning behaviour

In the context of participation in MOOCs, several researchers have found vast regional and cultural differences in behavioural engagement and persistence (Reich & Ruipérez-Valiente, 2019; Kizilcec & Halawa, 2015). For example, studies reported differences in course assessments (Liu et al., 2016; Kizilcec & Halawa, 2015), video watching behaviour (Liu et al., 2016; Uchidiuno et al., 2018) and social interactions within a course (Liu et al., 2016; Ogan et al., 2015). Between various geo-cultures, distinct learning patterns have also been noticed in reading versus video-watching behaviour (Uchidiuno et al., 2018; Liu et al., 2016; Reinecke & Bernstein, 2011). One way to approach this issue could be by designing an open, online course that adapts itself to the dynamic cross-cultural needs.

In line with previous research (Mensah & Chen, 2013; House, Hanges, Javidan, Dorfman, & Gupta, 2004), we used the GLOBE geo-cultural framework for learners' categorisation. This framework distinguishes global regions and their cultural constructs by categorising them into ten culturally similar clusters: Sub-Saharan Africa (AF), Anglo-Saxon (AS), Confucian Asia (CA), Eastern Europe (EE), Germanic Europe (GE), Latin America (LA), Latin Europe (LE), Middle East (ME), Nordic Europe (NE), and Southern Asia (SA). By categorising learners using these ten clusters, first we examined the association between the number of learning activities and learners' persistence in the MOOC. Second, we explored certain activity types that were an enabler for one geo-cultural group while limiting for another. Lastly, in a follow-up study, we explored the learners' experiences and their views on various activity types.

8.2 Case studies

In the first study (Rizvi et al., 2021a), we used a quantitative approach to inspect trace data for learners enrolled in ten large FutureLearn MOOCs ($n = 49,582$). The sample was diverse and heterogenous, with learners from all ten geo-cultural

regions. The largest subgroup belonged to the Anglo-Saxon countries, closely followed by South Asian, and African learners. The smallest subgroup originated from Nordic Europe. We examined whether (or not) differences regarding the number of assimilative activities (articles and videos), communication activities (discussions), and assessment activities (quizzes) within a MOOC could be used to predict learners' persistence. Next, we compared the predictive associations between the ten geo-cultural groups.

It is noteworthy that most quantitative methods remain biased in favour of the largest subgroup that exists in the data. Therefore, empirical studies often reflect the results fitting to the needs of the largest subgroup (Anglo-Saxon participants in our case), which may (not) be appropriate for other subgroups. To overcome this methodological issue, we used interaction terms in our analysis which takes into consideration the geo-cultural subgrouping as well as predictors, such as the number of the various learning activity types across the ten MOOCs. Advanced statistical methods associated with survival analysis were used to predict the outcome variable *persistence*. Persistence represents the learners' progression in the respective course using the percentage of course activities accessed by a learner before they dropped out.

The follow-up qualitative study utilised semi-structured interviews to collect information on learners' perceptions about the various types of learning activities in FutureLearn MOOCs. To understand these varied perceptions, several in-depth interview questions were used, for example, *Which learning activity type (article, video, quiz and discussion) did you enjoy most/least?* While we had a sample of 22 participants from seven geo-cultural groups, we were unable to recruit participants from Confucian Asia (CA), Latin Europe (LE) and Nordic Europe (NE). The study employed well-established and widely used method of thematic analysis (Braun & Clarke, 2006) to understand participants' perspectives and experiences. It is important to note here that we have only shared some of the relevant quotes, describing participants' experiences with the respective activity type, and not the entire outcome of the thematic analysis. The detailed results can be accessed via other publications that relate to this study (Rizvi et al., 2021b).

8.3 Selected findings

In order to explore if changing the number of learning activity types is associated with learners' greater persistence in MOOCs, we used a number of various learning activity types to predict learners' persistence in the respective FutureLearn course (Rizvi et al., 2021a). We quantified the predictive link and found distinct links for each of the activity types. The findings suggest that irrespective of the geo-cultural background, a large number of learning activities in a course design was not liked by most learners.

8.3.1 Assimilative activities: articles

The LD of most MOOCs examined in this study tended to include one or more reading activities that either contain reading material or links to other reading resources, or both. We found that increasing the number of reading activities was

associated with an increased risk of dropout. For the dataset we used, the analysis suggested an increased dropout risk of 14% for every 20 short reading steps added in a course, if the course already had around 52 such reading steps. The interaction analysis suggested that this dropout risk was most severe (and statistically significant) for learners from Latin American region (48%), followed by learners from Anglo-Saxon (28%) and African (7%) regions. During the follow-up interviews, this is how some participants shared their experience of reading activities.

I didn't perceive articles as reading content. And sometimes you can come across quite dense written word or content there. It has to be engaging, because it can be almost like reading a newspaper article. Yeah, quite long in length? I tend to find them to be a little bit, for-information-purpose-only type of thing, and not necessarily engaging.

(Participant13, Male, AS)

The quantitative results suggested that non-native English speakers, particularly from South Asian and Middle Eastern regions, were relatively less affected by the large number of articles in some courses. However, they deemed articles as *boring* or even *unnecessary* at times. Language barriers were mentioned frequently by non-native English speakers, as something negatively influencing their engagement with reading activities, as was also found in Chapter 7 (Rets, Stickler, Coughlan, & Astruc, 2022).

When you're studying (from an article) in [*participant's native language*], you can pick it quite in a limited time. But when it's in English, it takes you time to pick up those points and absorb that information.

(P6, Male, SA)

We found this result to be aligned with the previous literature that suggests that learners from non-English-speaking background tended to spend more time on assimilative (reading, watching) type of learning activities in online courses (Nguyen, Rienties, & Richardson, 2020).

8.3.2 Assimilative activities: videos

MOOC learning environments are generally recognised for their video lecture-based LDs. During the overall data analysis, we found a small yet significant link between the number of videos and persistence. Taking into consideration the presence of our ten geo-cultural groups, the link was not only quantifiable but also a large significance was noticed for several groups, particularly for South Asian learners. In other words, every increase of 9 videos in a course reduced the dropout risk for South Asian learners by 6% (given that the course already contained around 22 short instructional videos). In contrast, a small negative association was found between the number of videos and persistence for Anglo-Saxon learners, but further analysis found the risk to be not statistically significant. The most significant

association was found for Middle Eastern learners (9% increase in dropout risk). Furthermore, the interviews indicated that participants from Anglo-Saxon and Germanic Europe regions consistently reported their dislike of instructional videos in FutureLearn MOOCs, finding most of the videos to be far from engaging, perhaps *too slow* for their taste.

I am less likely to watch the videos as I am more likely to read the [video] transcripts...I think if I am watching a video, I am more likely to lose focus and to kind of, for my thoughts to like, kind of drift somewhere else.

(P3, Female, AS)

Participant 16 echoed this opinion,

I mean they [videos] are slow because they are always speaking very clearly, and slowly to make sure that you understand. Well, I've now lost my focus and I'm already at some other planet. It's just far too slow for me. It doesn't work and if you speed it up, gets on mentally, really weird! So, it doesn't work. Speeding it up doesn't work. So, that's why I dislike videos that are just far too slow for me.

(P16, Female, GE)

Learners from Anglo-Saxon regions tended to dislike instructional videos. In contrast, South Asian learners reported a strong preference for learning from videos.

The most favourite part I enjoyed is watching videos, the HD videos, which was just virtually...I was thinking as teacher is just teaching me sitting in front of me or I'm sitting in a virtual classroom and learning.

(P14, Male, SA)

8.3.3 Communication activities: discussions (instructor-led / user-led)

Almost all mainstream MOOC providing platforms now feature a social learning space in form of either a separate discussion forum, or a discussion space located directly underneath every learning activity (FutureLearn design approach) or both. Overall data analysis suggested a rather small, negative association between the number of discussions and persistence in the course (a 3% decrease in dropout risk with six more discussion-based steps added in a course already containing 14 discussions). A subgroup analysis suggested that the impact was again dissimilar across the various geo-cultural subgroups. For example, a negative association between early dropout risk and number of discussions was found for learners from Anglo-Saxon, Confucian Asia, Nordic Europe, Germanic Europe, Latin Europe and Latin America, with learners from these geo-cultural groups engaging less with the courses containing fewer discussions. In contrast, African and South Asian learners' did not favour a large number of discussion steps in a MOOC LD (i.e., early

dropout risk increased by 9% and 23%, respectively). Follow-up interviews suggested that learners from geo-cultural regions who were interested in discussions were still more inclined towards user-led discussions, and not towards instructor-led discussion. However, we found several differences in opinion within and across various geo-cultural groups, and our overall analysis remained inconclusive (Rizvi et al., 2021b). Still the respondents provided useful insights into their views on communication and social interaction in MOOCs.

I guess online, you might have thousands of people, making a point in front of thousands of people. It is completely different because there's very little chance that many of them will be listening or paying attention. So, I guess if it's a really large group, I feel more comfortable with that.

(P17, Female, AS)

In contrast, the large number of discussants participating asynchronously was an issue for others.

When you don't have time to engage every day, by the time you would log on the discussion, they would already be 20 or 30 posts.

(P20, Male, AF)

Furthermore, a lack of privacy or agency over one's comments was another concern raised by most participants, but primarily by female participants from Middle Eastern or Eastern European regions. Other participants identified a need for frequent interaction from the instructors' side to improve engagement, along with an inclusion of social-media style features in MOOC commenting spaces.

There was another thing I think should be included more often, and it is for example, participating in the discussion forums. I like using for example, the symbol at (@), like tagging people. So, they know that I'm mentioning them in my in my comment. But it's not that easy to come up with. Sometimes it works, sometimes it doesn't. But I think that is a good way to engage other learners in the conversations we are having in the discussion forums.

(P1, Female, LA)

8.3.4 Assessment activities: quizzes

Assessment activities are considered an essential part of the learning process, even in flexible, self-paced learning environments like MOOCs. However, in our research an increased number of assessment activities (i.e., quizzes) was found to have a negative association with learners' persistence in the respective course. With the sole exception of South Asian learners, the pattern was the same across all geo-cultural subgroups. We found, for example, that adding seven more quizzes in a course that already had around seven quizzes, tended to increase the average dropout risk by 15%. As discussed before, this pattern did not mirror the view of the

second largest subgroup of South Asian learners, where the association was positive, slightly favouring more quizzes in MOOC LD. The large elevated risks we noticed were for learners from Middle Eastern, African and Anglo-Saxon countries (7%, 9%, and 21%, respectively). The follow-up analysis to explore learners' perceptions about quiz-based assessment activities in MOOCs revealed various dimensions.

I do like quizzes. I think quizzes can give you a real sense of you know... One, they are fun, and two, it's good to sort of check. So, I think the quizzes are important because in some ways I know it sounds very old school, but like quizzes and tests and so on, are probably part of my own experience of education.

(P12, Female, AS)

Since in MOOCs most learners tended to prefer a pick-and-choose learning behaviour, they remained hesitant on being quizzed on the content they might have missed. But often learners did not consider frequent assessments to be a useful part of the MOOC LD.

I'm not there to be tested on, I would like to, you know, to discover new things. But I don't really like to feel that I am tested upon.

(P21, Female, EE)

8.4 Discussion

In Chapter 8, first we aimed to explore the predictive link between the number of different types of learning activities in an LD and learners' persistence in 10 FutureLearn MOOCs followed by 49,582 learners. While doing so, we also examined the extent to which the link between LD and persistence, differed between geo-cultural contexts. Second, we scrutinised learners' perceptions and their self-reported experiences with various types of learning activities using 22 in-depth interviews. As a whole, most learners preferred to have fewer rather than more activities in the LD of an MOOC. A notable exception was learners from South Asian countries, who chose to engage longer with MOOCs that contained a large number of small bite-sized learning activities. In contrast with previous work that pointed towards the critical role of discussions in MOOC learning (Manathunga et al., 2017; Allon et al., 2016), Chapter 8 found that LDs which provided many opportunities to interact with peers by instructing learners to discuss certain course topics actually averted active participation of learners from non-English-speaking geo-cultural regions, such as Sub-Saharan Africa and South Asia. We found that such an approach only slightly supported learners from Anglo-Saxon and European regions (GE and LE).

In addition, we found learners overall persisted more in the courses containing a greater number of assimilative learning activities (i.e., articles and videos), specifically those with instructional videos. As all the content in the ten MOOCs we analysed was offered in English, we expected greater engagement from native

English-speaking learners. However, most learners were found to disapprove of large amounts of reading materials. Increasing the number of articles increased the early dropout risk for all learners, even for those residing in the Anglo-Saxon regions and neighbouring regions (such as Germanic and Latin Europe).

Since most early MOOCs were offered in a video-lecture format, instructional videos have long been assumed to be a central feature in a MOOC LD. Our analysis of ten MOOC LDs with a varied number of videos revealed a minimal link of increasing the number of videos with learners' persistence. The only significant link we found was that only South Asian learners' engagement lasted longer by increasing the number of videos. Our qualitative analysis revealed that learners had contrasting opinions about course videos. For example, in line with Uchidiuno et al. (2018) who found non-native English-speaking learners to engage least with the videos that contain narration with no other visual support, Middle Eastern learners reported a desire to learn from either vibrant videos or from something "richer" than the videos (i.e., detailed informative articles) and learners from Anglo-Saxon regions and from Germanic Europe deemed clear, slow-paced videos to be disengaging.

Participants from all around the world consistently raised a need for more interactive videos or videos with embedded quizzes. Concerning the assessment activities in MOOCs, we found learners to persist more in the courses that offered quizzes in moderation. While learners from English-speaking and European regions liked to be quizzed in moderation, a slightly negative yet statistically strong association was found between the number of quizzes and persistence of learners from South Asian and Middle Eastern groups.

8.5 Limitations and moving forward

There are several limitations with the approach we used in Chapter 8. For example, all MOOCs used during the quantitative analysis were offered via the same MOOC platform (FutureLearn) and were designed by the same LD team at the Open University, UK. Moving forward, a better approach would require experimental manipulation of LDs, possibly during and between the course runs. A cross-platform analysis might also yield different results. Also, since all MOOCs under analysis were offered in English language, a comparison of monolingual versus multilingual MOOCs could reveal different patterns of engagement in dissimilar geo-cultural contexts.

As for the qualitative analysis phase, all semi-structured interviews were conducted in English, while a large number of participants (16 out of 22, or 73%) were non-native English speakers. The odds remained high that those participants might have struggled to verbalise their thoughts when asked about their experiences with the LD. Finally, the only demographic factor that was taken into consideration in Chapter 8 was learner's location at the level of the geo-cultural region. There could be several other individual and demographic factors potentially influencing learners' persistence and their overall experience with the course LDs. Such factors include age, gender, socio-economic status, and employment level. We acknowledge that

these factors can be part of learners' broader cultural experiences, but these factors are beyond the scope of current research. Along with the cultural dimensions, analysing the socio-economic and individual factors may yield interesting insights as few participants themselves pointed out.

Is there a standard African learner? Do you prefer them to be English language speaker, second speaker or third speaker? Do you prefer them to be male and unemployed or female and pregnant?

(p20, Male, AF)

8.5.1 Implications for practice

Our findings suggest that the link between persistence and changes in LD (changing number of various types of activities) varies with the geo-cultural context. Perhaps there is no ideal combination of learning activities that facilitate learners from all around the world and Chapter 8 provides some explanations as to why there is no single, universal LD for MOOC that can work for all learners. We found that a fixed, predetermined LD can hardly be inclusive, and our qualitative results echoed the quantitative findings. Until we reach the (difficult yet attainable) milestone of a flexible, culturally adaptive MOOC LD, we recommend taking a balanced approach by combining different types of learning activities, not just video-based, or reading MOOCs. Despite the fact that development of culturally adaptive MOOCs may not always be cost-effective, cultural adaptation in designs of open online learning environments is still strongly recommended, not automatically perhaps, but if chosen by the learners.

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