# Can MOOCs close the Opportunity Gaps? The contribution of social inclusive pedagogical design

## ¿Pueden los MOOC Cerrar la Brecha de Oportunidades?: La contribución del diseño pedagógico social inclusivo

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**ABSTRACT**
Massive Open Online Courses (MOOCs) are open courses made available online at no cost to the user and designed to scale up, allowing for a large number of participants. As such, they are a disruptive new development which has the potential to widen access to higher education since they contribute to social inclusion, the dissemination of knowledge and pedagogical innovation. However, assuring quality learning opportunities to all cannot be simply reduced to allowing free access to higher education. On the contrary, it implies assuring equitable opportunities for every participant to succeed in their learning experience. This goal depends on the quality of the learning design. To be successful, a massive open online learning experience has to empower learners and to facilitate a networked learning environment. In fact, MOOCs are designed to serve a high heterogeneity of profiles, with many differences regarding learning needs and preferences, prior knowledge, contexts of participation and diversity of online platforms. Personalization can play a key role in this process. In this article, the authors describe the iMOOC pedagogical model and its later derivative, the sMOOC model, and explain how they contributed to the introduction of the principles of diversity and learner equity to MOOC design, allowing for a clear differentiation of learning paths and also of virtual environments, while empowering participants to succeed in their learning experiences. Using a design-based research approach, a comparative analysis of two course iterations each representing each model is also presented and discussed.
**KEY WORDS:** distance education, open learning systems, online learning, equal opportunity in education, education for all.

**RESUMEN**
Los cursos en línea abiertos y masivos (MOOC) son cursos abiertos disponibles en línea sin costo para el usuario y diseñados para ampliarse, permitiendo un gran número de participantes. Como tales, son un nuevo desarrollo disruptivo que tiene el potencial de ampliar el acceso a la educación superior, ya que contribuyen a la inclusión social, la difusión del conocimiento y la innovación pedagógica. Sin embargo, garantizar oportunidades de aprendizaje de calidad para todos no puede reducirse simplemente a permitir el acceso gratuito a la educación superior. Por el contrario, implica asegurar oportunidades equitativas para que cada participante tenga éxito en su experiencia de aprendizaje. Este objetivo depende de la calidad del diseño de aprendizaje. Para tener éxito, una experiencia de aprendizaje en línea abierta y masiva debe empoderar a los alumnos y facilitar un entorno de aprendizaje en red. De hecho, los MOOC están diseñados para servir a una gran heterogeneidad de perfiles, con muchas diferencias con respecto a las necesidades y preferencias de aprendizaje, conocimiento previo, contextos de participación y diversidad de plataformas en línea. La personalización puede jugar un papel clave en este proceso. En este artículo, los autores describen el modelo pedagógico iMOOC y su derivada posterior, el modelo sMOOC, y explican cómo contribuyeron

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a la introducción de los principios de diversidad y equidad en el diseño MOOC, lo que permite una clara diferenciación de las rutas de aprendizaje y también de entornos virtuales, al tiempo que permite a los participantes tener éxito en sus experiencias de aprendizaje. Usando un enfoque de *design-based research*, también se presenta y discute un análisis comparativo de dos iteraciones del curso, cada una representando cada modelo.
**PALABRAS CLAVE:** educación a distancia, sistemas de aprendizaje abiertos, aprendizaje en línea, igualdad de oportunidades en educación, educación para todos.

## 1. Introduction

### 1.1. The emergence of MOOCs

Access to quality education is considered to be a universal right. This right should consubstantiate a mission and a vision for all higher education institutions across the world as suggested by the UNESCO Education for the Sustainable Development Goals (SDG 4 - Unesco, 2017). However, assuring quality education for all is a much complex and ambitious goal which cannot be mistaken with the simple guarantee of universal access. Educational justice encompasses other crucial elements as social inclusiveness and learner equity. Every human being should be given fair chances to engage and succeed in quality higher education experiences. This means learning opportunities should be designed in such a way as to meet each person's specific needs and respect his/her own context. In an era of abundance of digital educational resources, Massive Open Online Courses (MOOCs) bear a tremendous potential for achieving such goal. But, this will only be possible if these courses are conceived as to promote knowledge sharing and learning in a truly open, social inclusive and equitable environment.

A MOOC can be defined as "*an online course designed for large number of participants that can be accessed by anyone anywhere, as long as they have an internet connection, is open to everyone without entry qualifications and offers a full/complete course experience online for free*" (Brouns et al., 2014). First appearing in 2008 as an evolution of the open education and the Open Educational Resources (OER) movement (Siemens, 2005), these courses offer the possibility of accessing a quality non-formal higher education learning experience without restrictions and costs. Successful conclusion of these courses, however, may lead to formal certification of the acquired competences. By combining openness and scalability, MOOCs offer unprecedented access to learning. In this sense, it has been argued that they contribute to social equity by allowing many populations access to quality higher education, even though their socio-economic impact has yet to be investigated (Rolfe, 2015).

Having been first developed as a test bed for the connectivist (or connectivist inspired) view on learning, MOOCs came to be originally associated with this movement. This before the success of the Ivy League-led initiatives took over the expansion of this new learning format, from 2012 onwards. Based on a participatory pedagogy and on networked learning, the pedagogical principles and practices followed by these MOOCs are quite different from those offered through Udacity, Coursera or EDx (Daniel, 2012; Siemens, 2012b; Watters, 2012). So different, in fact, that using the same name to designate them is confusing (Hill, 2012). Downes proposed a useful distinction, calling the former cMOOCs and the latter xMOOCs (Downes, 2012; Watters, 2012), which has since been widely adopted. While cMOOCs are connectivist in nature and understand "open" as it has been defined in the open education field (OERs, Open Educational Practices - OEPs), xMOOCs follow a more traditional approach to learning and see "open" mostly as a synonym for "free of charge" (although even this might change in the near future). As George Siemens describes, the cMOOC model emphasizes creation, creativity, autonomy, and social networked learning. Thus, it focuses on knowledge creation and generation. The Coursera model, on the contrary, emphasizes a more traditional learning approach through video presentations and short quizzes and testing. This is to say, the xMOOCs focus on knowledge duplication (Siemens, 2012a). As such, opposite to the cMOOC, the xMOOC approach does not aim at building equitable learning environments. Instead,

its focus is on scaling up the outreach by widening access, but not on promoting participation in the learning process itself.

Lisa M. Lane (2012) proposes another interesting distinction aimed at accommodating other MOOCs, like ds106 – Digital Storytelling, which do not fit either "c" or "x" models – network-based (the cMOOCs), content-based (the xMOOCs) and task-based MOOCs (like ds106). Common to all types of MOOCs is that they are a developing field, with a lot of experimentation going on and many relevant questions to be answered (Watters, 2012). Completion rates are low in all of them (Gil-Jaurena et al, 2017; Jordan, 2013; Daniel, 2012; Hill, 2012; Holton, 2012;) and problems related with student satisfaction, learning support, technological environment and the quality of the learning experience are yet to be fully addressed (Daniel, 2012; Holton, 2012; Kop et al, 2011; Siemens, 2010).

Designing and running a MOOC involves several logistical, technological, pedagogical and financial issues (Alario-Hoyos et al, 2014). Precisely one of the characteristics that explain the power of MOOCs is in turn one of the biggest challenges for its design: massiveness (Guàrdia et al, 2013; Santos et al, 2014). Given that MOOCs have the potential to engage a large number of participants in a single course, thus fostering social inclusion, the heterogeneity of learners is high, i.e. they represent a wider and larger diversity compared with students in traditional courses. This could be even enhanced when using MOOCs to address social groups or communities at risk. In fact, there is a higher variety in the learners' maturity level and experience, as well as in their educational and cultural backgrounds, specific knowledge and skills (Daradoumis et al., 2013; North et al., 2014); there is also more diversity in intrinsic and extrinsic motivation factors (Teixeira & Mota, 2013; 2014). But their profile is not the only difference, because they can use different devices to access the courses, e.g. personal computers or mobile devices (Gutiérrez-Rojas et al, 2014), which implies that some formats of learning content may not be displayed while using some devices.

The aforementioned problems can be solved both by a specific pedagogical design strategy, using elements as assessment and accreditation options, for instance (Teixeira & Mota, 2014), and by means of personalization or adaptation of MOOC content to the participants' profiles (prior knowledge) and interaction preferences (device used) (Daradoumis, et al., 2013; Santos et al., 2014). This more equitable solution would overcome the problems related to the overwhelming amount of information available and generated in an open online environment (Fournier et al, 2011). Moreover, content customization based on user profiling is a desirable characteristic for MOOCs because it enhances the learning process, optimizing the time spent in learning activities and effectiveness of participation with respect to their individual capabilities (Daradoumis et al., 2013). Therefore, as the education experience should focus on the context-centred processes and not as much on content-driven or container-driven approaches (Cobo, 2016), MOOC learning environments should be able to adapt in relation to the specific learning context. Thus, participants should be able to access specific content, adjusted to the type of media used, establish their own learning sequence, and hence enjoy a unique online experience that supports a quality learning process (Daradoumis et al., 2013).

1.2. The design principles of the iMOOC

A new generation of pedagogical approaches has emerged in recent years, mainly in Europe, which tries to combine the more community based and participatory connectivist approach to MOOCs with some elements that can be found in xMOOCs, but used in a different pedagogical context and for different purposes (Schuwer at all, 2015). The first such attempt was the iMOOC pedagogical model, developed by a research team at Universidade Aberta (UAb.pt) in the framework of the first pan-European initiative on MOOCs - OpenupEd (http://www.openuped.eu), led by the European Association of Distance Teaching Universities (EADTU, 2015) with support from the European Commission.

The first experimental iMOOC was launched on 25th April 2013. This was the first known institutional model in the world specifically designed for open courses, in particular MOOCs. It started by asking one fundamental question: how to combine typical non formal learning experiences

with a formal education setting? Instead of trying to replicate an instructional, traditional approach, a more innovative path was taken: to find a synthesis that articulated the potential of networked learning with the structure of higher education online pedagogy (Teixeira & Mota, 2013; 2014). This pedagogical design approach was labeled iMOOC given its focus on individual responsibility, interaction, interpersonal relationships, innovation and inclusion.

Stemming from the already existing UAb's Virtual Pedagogical Model for formal courses and its four pillars - learner-centeredness, flexibility, interaction and digital inclusion (Pereira et al, 2007) – there was a combination of autonomous and self-directed learning with a strong social dimension and the interaction that make learning experiences richer and more rewarding. There was also the need to articulate the flexibility that distance online learners need, especially adults with demanding professional and personal lives, with the pacing necessary to help them get things done. One of the main objectives was to make learning available to as many people as possible, but also to bring these people into the digital online environment, where a crucial part of modern life happens, thus helping curb the digital divide (Teixeira & Mota, 2014).

There are elements in all types of MOOCs that are interesting and useful, but none of them fit exactly UAb.pt's pedagogical model. In terms of the MOOC territory, the iMOOC model draws mostly on cMOOCs and the general connectivist approach to learning, and incorporates elements from other existing approaches, such as short videos, formative tests or peer-assessment, albeit used in a different pedagogical context and for different learning purposes. Some other relevant aspects were added that derive from UAb's experience with online learning and its integration in the larger context of UAb.pt's Pedagogical Model, namely a "boot camp" week, the design of meaningful activities/tasks or effective strategies for online communication, as well as from the work that has been done regarding Open Educational Resources and Open Educational Practices. Following the current terminology in the field, the model was labelled iMOOC to highlight its focus on individual responsibility, interaction, interpersonal relationships, innovation and inclusion.

In this model, courses are open to everyone who wants to participate. Registration is required for publishing in the institutional spaces, but all course contents are accessible to anyone. Learning is learner-centred and based on the realization of activities. Courses start with a "boot camp" module, that can last one or two weeks, meant for participants to get acquainted with the spaces, tools and services, as well as with the processes of work and communication that will be used in the course.

Learning should be evidenced through the creation of artefacts (texts, videos, presentations, slidecasts, mind maps, mash-ups, etc.), freely accessible online, which demonstrate the learner's knowledge and competencies regarding the material studied. The learning process combines autonomous self-study and reflection with interaction with other participants in an open social context. Participants are expected to take an active role in and be responsible for their own learning, but also to actively engage in helping build a supporting learning community.

Learning support rests in the learning community, through collaboration, dialogue, peer feedback and active engagement from participants in the learning process. Resources provided as a starting point for the realization of the activities are licensed as Open Educational Resources or freely available on the Internet. Formative assessment can take the form of self-correction tests and also of peer feedback regarding the artefacts produced in the learning activities.

Although there is a central place for the course (website, wiki, blog, LMS, etc.), where all relevant information is provided (content, resources, schedule, instructions, etc.), most of the work and interaction should benefit from a networked learning perspective, whereby students use their own personal learning environments to manage their learning, publish their artefacts and engage in the conversation with other participants. A small team of collaborators can be used to support the implementation of UAb.pt's iMOOCs – gather relevant information to be used to monitor and perfect the ongoing process, serve as community facilitators, monitor social or information networks for course related content, elaborate weekly summaries, etc.

As stated above, a critical element of the Model is its contribution to facilitate the transition from non-formal education to formal education through certification. This is majorly played by the way certification options are embedded in the courses.

In the iMOOC Model, graded assessments are included for participants who want to receive a certificate of completion of the course. In this case, at least two of the artefacts produced as evidence of learning by participants will be assessed and graded through a peer-review system – those who wish to participate in the peer-review assessment will grade the artefacts produced by 3 other participants and have their artefact graded by three other participants. The final grade will be the average obtained in the 3 grades given. E-portfolios can also be used for grading purposes where they are considered adequate. The assessment follows the same peer-review procedure. Every assessment will be based on a detailed rubric provided by the professor or professors leading the course.

But, in order to fulfil its purpose of bridging the gap between non-formal education and formal education, the Model also allows for participants who want it or need it to go a step further. Thus, UAb.pt's iMOOCs offer participants the additional option of obtaining formal credits, for a fee, after the completion of the course. Those credits (ECTS) will be awarded following an evaluation by a professor or tutor comprising the two (or more) graded artefacts and an e-portfolio presented by the participants with the most relevant elements of their work in the course. This can be combined with a final, face to face exam when deemed adequate.

1.3. From the iMOOC to the sMOOC: Towards a social inclusive MOOC

The IMOOC formed the basis of a subsequent model – the sMOOC -, developed in 2014 as part of the European Elearning, Communication and Open-data project: Massive Mobile, Ubiquitous an Open Learning – ECO (https://project.eco-learning.eu), which had as one of its objectives the creation of a pan-European alternative to the now dominant xMOOC approach disseminated by elite American universities. The sMOOC, as the original iMOOC model, draws on connectivism, situated learning and the general social-constructivist perspective that has always characterized online learning (Brouns et al., 2014).

The "s" in sMOOCs stands for "social", since they provide a learning experience marked by social interactions and participation, and "seamless", since ideally they should be accessible from different platforms and through mobile devices and integrate with participants' real life experiences through contextualisation of content via mobile apps and gamifications. Moreover they are designed as to accommodate various pedagogical approaches. The sMOOC model design features also include to be open, inclusive and accessible to a wide diversity of citizens, as well as to pay special attention to both people in risk of social exclusion and people with visual and hearing disabilities. In fact, the model was conceived as a pedagogical framework which allows for the flexibility in approach and design (Brouns et al, 2016).

Another important aspect regarding the social and cultural inclusiveness of the sMOOC model is that it states courses should be designed to accommodate a wide spectrum of approaches and contexts, accounting for a variety of languages, cultures, settings, pedagogies and technologies (Brouns et al., 2014). Regarding learner equity, the pedagogical approach is deemed very essential such that participants are facilitated with appropriate incentives to make progress and to succeed in their learning efforts (Brouns et al, 2016).

By mixing the traditional pillars of open education theory with elements from socio-constructivism, sMOOCs are designed to provide a learning experience marked by social interactions and participation. This aspect is complemented by seamless and ubiquitous learning (Wong et al., 2015). As the concept implies the courses should be accessible from different platforms and through mobile devices and integrate with participants' real life experiences through contextualisation of content via mobile apps and gamifications (Brouns et al, 2016).

This social seamless MOOC model seeks to improve the quality of the learning experience by strengthening the social component of participant support, as well as by

promoting access from multiple learning platforms and mobile devices, ensuring a ubiquitous, comprehensive and contextualized learning experience. Likewise, the model also aims to promote the relationship between learning and participants' life experience through contextualization of content, supporting adaptive learning strategies which resort to mobile and gamification applications. (Brouns et al., 2014; Osuna & Camarero, 2016; Teixeira et al., 2016). In this new context, the learning process has come to be perceived as increasingly more personal and flexible, but also shared and scalable.

However, because the courses created using this model can have a wide variety of target populations, purposes and local, contextual implementations all over Europe, the model was designed as an open framework to allow for local and contextual choices that make the courses effective. Contextual implemented solutions that seem productive and applicable to other scenarios can enrich the pedagogical practices recommended, by being incorporated into the framework in an ongoing innovative process (Brouns et al., 2014).

## 2. Methodology

2.1. Case studies: the iMOOC and sMOOC

The iMOOC model was subject to a pilot test run in May 2013. UAb.pt developed the pilot course named *Climate Changes: The Context Of Life Experience* [41]. Moodle (version 2.4) was used to centralize the main information regarding contents, resources, suggested activities, schedule, etc. It also harboured the discussion forums, one of the places where participants could interact and debate on relevant aspects of their learning process. This was integrated with Elgg, an open source social networking platform to be used as an institutionally supported Personal Learning Environment (PLE). The course which was delivered in Portuguese had 3 further iterations in the framework of the European Multilingual MOOC Aggregator - EMMA project (https://platform.europeanmoocs.eu). These additional iterations were delivered in a multilingual environment.

The course *Digital Competences for Teachers* served as a test bed for the sMOOC. As previously referred, the sMOOC model builds upon the iMOOC, further exploring its potential and adding additional features, as mobile accessibility and gamification. This allowed for a continuous research-based incremental development of UAb's pedagogical approach to MOOC design. Such process which aims at the sustainability of the learning design framework, included continuous cycles of design, implementation, analysis, reflection and redesign as described in the design-based research model literature (The design-based research collective, 2003). This methodology is particularly appropriate when it comes to creating and expanding knowledge related to the development, implementation and support of innovative learning environments. Development and research take place in authentic scenarios as is the case of the current study.

The main goal of the pilot course *Climate Changes: The Context Of Life Experience* was to introduce the concept of climate changes in the context of sustainable development, relating it to the experiences lived by each one of us of how to adapt to them and curb their effects, be it floods, water shortage, rise in the sea level or coastal erosion, to name a few.

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[41] The Course was based on available OER produced in the framework of Lech-e (LECH-e – Lived Experience of Climate Change E-Learning - http://www.leche.open.ac.uk), an EU-funded project led by the Open University.

The authors' intention when designing the course was not to determine what should be done in terms of climate change, but to prepare participants to understand and analyse critically a diversity of perspectives on the topic. During the course, the learning community looked at scientific, political, economic and social components of climate change, as well as their connection with sustainability.

The course ran from May, 6 to July, 1st, with a total duration of 8 weeks. The first week was dedicated to the "boot camp" module. The remaining 7 weeks were divided into 5 topics:

1. Introduction. What science tells us about climate change.
2. Economy and climate change.
3. The politics of climate change: a political science perspective.
4. The sociological perspective on climate change.
5. Climate change: Integration of perspectives in the ambit of Sustainable Development.

The pilot course attracted 1.016 registered participants, of which over two thirds actually started the first learning activities according to the schedule.

As referred above, the *Digital Competences for Teachers* course was designed according to the sMOOC model and had 5 iterations, all of which in Portuguese. The process was developed in 4 phases that occurred over three years:

1st) Course Design (2014);
2nd) Iterations of the course with 3 editions in 2014 and 2015;
3rd) Course evaluation;
4th) Re-design of the course and its application in new editions in 2016.

The course lasted 5 weeks and was organized into 4 topics:

1. Introduction.
2. Searching, selecting and sharing resources on the Internet.
3. Using digital skills in the classroom.
4. Promoting collaborative learning with digital tools.

Similarly to the iMOOC design architecture, the learning experience in the sMOOC pilot also started with the "boot camp" module. The following topics focused on three distinct subject matters. During the first topic, activities were meant to familiarize participants with the learning environment and the forms of communication, interaction and publication in the course. Participants were challenged to complete certain tasks in order to develop skills that would allow them to optimize the use of tools available in the spaces where interactions took place (Moodle and Elgg) and consequently build their own PLE.

2.2. Questionnaire-based data collection and analysis

During the eight week of the iMOOC *Climate Changes: The Context Of Life Experience*, a satisfaction survey was launched, open to all registered participants. The questionnaire was delivered in Portuguese and was accessible through the learning environment. It included 5 dimensions, as follows: participation in the course, overall quality of the course, course content and objectives, pedagogical support and methodologies, learning environment.

In what regards the sMOOC *Digital Competences for Teachers*, a specific questionnaire was developed in order to obtain a more complete understanding of the needs of the participants in the

course and to improve their learner's experience. The evaluation was conducted as part of a general survey of the ECO sMOOCs on all 15 courses in 6 languages (English, German, French, Italian, Portuguese or Spanish).

The questionnaire consisted of 5 socio-demographic questions, 2 on the student profile and 24 questions aimed to evaluate the design, content and course development, as well as overall dimensions of the sMOOCs. (Brouns et al., 2016; Fueyo et al., 2015). Data was collected using a self-administered questionnaire with closed or semi-closed questions. It was deployed using the LimeSurvey open source platform and the data collected was analysed with SPSS (Statistical Package for Social Sciences).

In our research we have compared the results obtained through the two different questionnaires. the typical limitations associated with these tools were taken into consideration in the discussion of results and the drawing of conclusions.

## 3. Results

### 3.1. The iMOOC *Climate Changes: The Context Of Life Experience*

The Elgg component of the learning environment provided a diverse set of tools for publishing, debating, selecting topics, and following other participants. A high volume and quality of interaction amongst course participants was one of the main features of the *Climate Changes: The Context Of Life Experience* course (Coelho et al, 2015). The total number of wire posts published during the first half exceeded one thousand (1155), as shown on table 1. This microblogging tool had an important role in the communication flow and in the social presence of participants, as a later study has confirmed (Ramalheiro & Morgado, 2018). Plus, over seven hundred blog posts (717) and four hundred files (410) were also published.

However, the transition to week 5 in the course brought a sudden and steep decrease in presence and participation. Despite some attempts to revive the very good dynamics and overall activity levels of the first half – we launched some challenges and did a Google hangout with an expert, among other things – the numbers relative to the second half of the course are significantly lower when compared to those of the first half, as shown in the table below.

Table 1
*Number of Items Published in the Social Learning Environment (Climate Changes course – 1ˢᵗ iteration)*

| Number of Items Published on Elgg (1.016 participants) | | | |
|---|---|---|---|
| *Wire posts* | *Blog posts* | *Favourites* | *Files* |
| First 4 Weeks | 1155 | 717 | 431 | 410 |
| Total 8 Weeks | 1497 | 952 | 506 | 487 |

A total of 102 participants answered the final questionnaire Overall, the levels of satisfaction expressed in the answers to the questionnaires referring to both courses were very high. Considering the 1ˢᵗ iteration of the *Climate Changes* course, of a total of 94 respondents to this question, 90% said that they would recommend the course to other people, and 84% would take another iMOOC course, if they had the chance. When asked to evaluate the overall quality of the course, 38% of the 95 participants who answered this question rated it as excellent, while 45% rated it as good.

54% of 95 respondents totally agreed that the "boot camp" week had been an essential phase in the course, and 37% agreed with this statement. A further study has confirmed the perceived importance of this module in the increase of the social aspects of the learning process, as well as in the familiarization with the processes of working and communicating in the course's network (Morais & Morgado, 2017).

Questions related to the course content and objectives were also very positively valued. When presented with the statement "The course contributed to change my personal attitudes regarding environmental issues", 35% of 95 respondents totally agreed, while 41% agreed. As for "After this course, I believe that the consequences of climate change are an inescapable reality", 54% totally agreed and 32% agreed.

The pedagogical support and methodologies throughout the course were very well rated. The Learning Guide was considered very useful in scaffolding and supporting learning (totally agree, 43%; agree 53%); the detailed instructions for the tasks were clear (totally agree, 63%; agree, 30%); the suggested activities were interesting (totally agree, 38%; agree, 60%); and the learning support was adequate (totally agree, 48%; agree, 43%).

Finally, the learning environment was considered good (42%) or very good (36%).

## 3.2. The sMOOC *Digital Competences for Teachers*

Regarding the *Digital Competences for Teachers* course, we've focused on the 3rd iteration as it presented the most consistent set of data. It had 342 enrolled participants and similarly to the 1st iteration of the *Climate Changes* course, the level of interaction was also high (Teixeira et al., 2018). Through topics 1, 2 and 3, participants posted more wire posts (413), followed by blog posts (140), and favorites (99), as shown on table 2.

Table 2
*Number of Items Published in the Social Learning Environment (Digital Competences for Teachers course - 3rd iteration)*

| Number of Items Published on Elgg (342 participants) | | | |
|---|---|---|---|
| | *Wire posts* | *Blog posts* | *Favourites* | *Files* |
| Total 5 Weeks | 413 | 140 | 99 | n.a. |

The results show that a central core of the community - the full participants (Wenger, 1998) - albeit small, followed the three topics, creating their PLEs. This is also confirmed by the very positive perception of the participants in the 3rd iteration of the *Digital Competences for Teachers* course. The survey had 30 respondents. The majority of them considered that the contents covered the course subject completely (69,6%), and that they were interesting and relevant (59,5%). This trend is also shown in respect to the accuracy (78,3%) and actuality of contents (82,6%). In relation to the adaptability of contents, the participants were divided regarding their opinions: 52,% agreed that they were «feasible to people with different learning skills and background», and 34% considered that they were «to a large extent feasible to people with different learning skills and background», while 13% agreed «but only in a certain way». In total, 86,9% of participants evaluated the course duration as suitable.

Considering the encouragement of discussion and personal reflection (69,6 %), promotion of interaction (69,6%), promotion of learner involvement (65,2%) and promotion of creativity (65,2%), their opinion was that the items previously identified were completely satisfactory. Although the adequacy of the objectives was less positively evaluated (47,8%).

Most of the participants evaluated the social interaction between them and the support received as very good (79,2%), with a high number of them considering that it was excellent (47,8%). Regarding the incentive for communication and interaction among the participants, the evaluation was also positive, with the majority agreeing completely that it had been effective.

## 4. Discussion

In what respects the 1st iteration of the *Climate Changes: The Context Of Life Experience* course, access levels were high during the first half – first four weeks - of the course, with a regular decrease as the course progressed. This was already expected and confirms a typical phenomenon in this kind of courses (Xing at al., 2016; Conole, 2015; Breslow et al., 2013).

Also of particular significance was the fact that interactivity levels were untypically high in the first four weeks. According to our interpretation, this phenomenon resulted from the successful introduction of the initial facilitation "boot camp" module. In fact, this innovation allowed for the community to establish all its basic communication networks. Moreover, it facilitated the building of a community spirit and some sort of shared identity even before participants got in touch with the course contents and the actual learning activities started.

We cannot say that we have hard data to account for and explain the sudden decrease in presence and participation in the transition to week 5 of the course, but we identified some aspects that we think may have been responsible for this. The fifth week coincided with the final week of school year in our secondary schools, and an important part of the participants were teachers. This is an extremely busy week, followed by another with assessment meetings, and many participants may have felt overwhelmed and incapable of juggling this kind of responsibility and workload with the participation in a free course.

On the other hand, this was the week of the first graded artefact and the subsequent peer-assessment process, for those who wanted to get a certificate of completion. Although the peer-assessment process was mandatory only for these participants, it may have helped increase stress levels and create the perception, especially among participants who were already struggling with managing their time, that they couldn't keep up with the course, leading them to quit.

Finally, participants can only maintain the extra-level of effort and workload that a course adds to their daily professional and personal life for a given period of time. After that, it becomes increasingly difficult to keep up, especially in the case of a free course that, because it has less "hard" incentives than a formal, paid one, can drop very quickly in the list of priorities and be dismissed in face of the mounting pressure or unexpected trouble (work emergencies, family health, etc.). That is why, as a result of the experimentation phase, the typical duration of courses in the iMOOC model was decreased to six weeks. Furthermore, we have considered the relevance of having graded, peer-assessed artefacts in all courses, or only in those where that is deemed very important, using peer-assessed eportfolios instead in the other courses for the certificate of completion. Finally, and this is not always possible or feasible, we think more attention needs to be paid to the course schedule, avoiding specific times of the year that may be obviously busy or difficult for a big part of the expected participants.

In what respects the 3rd iteration of the *Digital Competences for Teachers* course, the high levels of interaction were also a paramount feature. Participants had different goals and different learning paths, especially those with a more active presence in the community than those with a less visible presence, who sought the course with other motivations, such as accessing up-to-date and credible resources. The discussion about the concepts mobilized in the various topics, accompanied by the sharing of resources, demonstrates the interest of the participants regarding the deepening of the concepts. There was a search for resources, seeking to substantiate points of view, which were shared, used and consulted by other participants. The social engagement of the learners was a clear dominant positive element throughout the course duration.

This effort to disseminate and share knowledge was stimulated by the proposed activities, as well as the incentives given by the facilitators. A "networked learning" experience resulted from the individual interest, sharing of situations and resources among participants,

and the encouragement provided by the design of the course itself (Teixeira & Mota, 2014; Teixeira et al, 2018).

Participants highlighted learning through interactions and artefact creation, revealing knowledge, skills and an active role that sustained the learning community (Tillema et al., 2015). Although the results indicate the participants' involvement and the occurrence of learning, the small number of artefacts submitted may mean that the interest in the course had to do with the current presence of the theme in schools and the possibility of mobilizing digital skills necessary for the learning process. professional practice and sharing of resources and experiences.

The interest of the participants was essentially focused on accessing the informative and argumentative richness of a large-scale debate on the themes concerned, with the possibility of sharing diverse practices and experiences, thereby consolidating points of view, enriching knowledge and achieving new learning.

## 5. Conclusions

MOOCs offer a new range of exciting possibilities for widening access and participation to quality education, thus promoting more open, equitable and social inclusive learning environments (Lambert, 2020). However, most MOOC offerings today do not follow this aim. They use a very directive instructional approach, not facilitating learner's participation and collaboration. Many even impose restrictions to access and the use of resources, not providing a truly open approach to learning. Its only focus being the quality of the content provided and the outreach of its distribution system. Such course provision only reinforces the education divide in our societies.

In this paper we present a study on two MOOCs designed under the framework of the iMOOC and the sMOOC pedagogical models (*Climate Changes: The context of life experiences*, and *Digital Competences for Teachers*) applying a design-based research methodology (Cobb et al., 2003). We describe their alternative design process and demonstrate how they contribute to promote equity and social inclusion by facilitating learner's interaction and participation, as well as adaptability to context. In our analysis we suggest educational justice in digital learning environments does not rely on technological access or access to technology alone, but mostly on learning design. As referred by Lambert (2020) in her extensive review of MOOC contribution to student equity and social inclusion, the intentional and collaborative design for disadvantaged cohorts is of critical importance. Successful design collaborations often feature learner-centred, non-technical partnerships with community groups which increases the understanding of the needs of particular marginalised learners, while also providing more sustainable and distributed learner support.

Differently from most MOOC approaches, the iMOOC and sMOOC pedagogical models allow to close the opportunity gaps by allowing everyone independently of each one's context to equally engage in meaningful transformational learning experiences. This is achieved partly by the extensive use of peer-based assessment, but also innovative forms of certification. As the pilot tests showed the certification options embedded in the courses allow participants to manage their own learning experience, determining the kind of final output that is best suited for their learning needs. This includes the possibility of their non formal learning experience being subject to formal accreditation.

Another major element is how the iMOOC and sMOOC models contribute to increase digital literacy and inclusion. This is due to the introduction of the "boot camp" module, which promotes a rapid and precocious establishment of a learning community. It allows for a much higher level of interaction and dialogue among participants throughout the learning process. Finally, the dynamics of the learning process are enhanced by the higher communication levels and the high degree of transparency of the course activities.

The analysis of the results shows a significant interaction within the MOOC community's virtual spaces (interaction with resources and social interaction among participants), which led to the development of digital skills and knowledge appropriation and the production of new content. This positive reaction from participants to the proposed activities resulted arguably from the instructional design, which sought to create collaborative learning opportunities and to propose content and activities related to participants' life experiences (Brouns et al., 2014; Osuna & Camarero, 2016).

The iMOOC and sMOOC models were tested and used in several different learning environments. The continuous development of the models and its derivatives has therefore benefited from the critical input of many expert practitioners from several European universities. Furthermore, a simplified version of the iMOOC, the UAbX, was at the base of the development of the pedagogical approach of the NAU initiative - the Portuguese Government-supported platform for open science and MOOCs.

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