# TEACHER EDUCATION THROUGH MOOC: A CASE STUDY

**Vitor Gonçalves[1], Isabel Chumbo[1], Ester Torres[2], Bruno Gonçalves[3]**

[1] *Polytechnic Institute of Bragança (PORTUGAL)*
[2] *Universitat Rovira i Virgili (SPAIN)*
[3] *University of Minho (PORTUGAL)*

## Abstract

Massive Open Online Courses (MOOC) are viewed as one of the most recent opportunities for distance learning. The growing demand for this type of training, usually informal, has been gaining momentum by maximizing equity in education and training.

Although its apparent informality, MOOCs can be used in a formal context and approach, thus contributing to Teacher Education at a more global level.

Teacher Education in Portugal is implemented throughout the whole school year and implies the attendance of training courses at a specific institution.

MOOCs are therefore an alternative and easier way to implement continuous training.

This paper presents a case study in which a MOOC was developed and implemented in order to attract teachers to this new way of sharing knowledge. The MOOC was called "A MOOC on MOOCs and other educational technologies" and had 17 teachers attending. Fifteen finished the training course and created their own MOOC on the Udemy platform.

The participants were from various academic backgrounds and had different professional experiences. Nevertheless, their digital competences were quite homogenous in terms of using synchronous and asynchronous tools.

This work aims at clarifying the contribution MOOCs can have in teacher education and at understanding the perception teachers have from their own evolution after developing and implementing their own MOOC. These objectives were assessed through questionnaires at three different stages: before, at the end of the course and four months after the end of the course. Apart from questionnaires, observation was also used as a means to understand the ongoing teacher's reactions to their learning process, since the three trainers were key elements in a participatory action research approach.

The analysis of the questionnaires show that the participants considered the MOOC as a scientifically valid training course which has contributed highly to their continuous education.

Throughout the paper the development of the whole experiment will be explained in its different stages, providing a clear analysis of the results and feedback of the participants and trainers confirming that MOOCs can be used in the context of Teacher Education in Portugal, where the experiment was a novelty, as well as in other similar contexts in other countries. MOOCs facilitate access to education for educators, eroding space barriers in a time where teachers need to be empowered for the 21st teaching and learning process.

Keywords: teacher education; MOOC; case study.

## 1 INTRODUCTION

Internet has evolved to a bidirectional communication model in which the user has gained an active and participative role, both from the web reader and web writer point of view. The user has moved from the receptive role of static webpages, common in the 1.0 web era to the role of producer and consumer of information since the web has evolved to 2.0 and is now viewed as a platform containing dynamic pages.

In this context the teacher has the possibility to access multiple multimedia contents when attending online courses, but also to create the contents or courses himself.

New forms of collaboration and constructing knowledge are being built outside the physical walls of educational institutions. Diverse digital resources are recognized as a legitimate medium ([1], [2], [3]),

but also as a new way to learn, think and teach ([4]). Their impact on learning frameworks is huge and this has clear implications for the teacher and the evaluation to be carried out.

The platforms for the creation and dissemination of MOOCs (Massive Open Online Courses) are one of the most recent examples of this kind of evolution.

It is possible to state that MOOCs correspond to a progress in the innovation tendency, in the experimentation and use of technology which began with online distance learning aiming at a more massive type of learning opportunity ([5]).

MOOCs are open courses which are made available on the net for a very high number of participants. They base themselves on the principles of open education ([6]; [7]) and their main goals are to allow new forms of teaching and learning with the support of technologies. MOOCs are usually courses with no formal pre-requirements, they charge no fees, or either charge very low ones related to certification or accreditation procedures.

MOOCs show small audiovisual clips, as well as recommended texts and allow the participation in debates through diverse social media tools or forums. Within the courses, formative tests can be carried out, other kinds of evaluation and even exams.

The designation of MOOCs themselves explain most of what they signify. They are massive because they are made available for a very wide audience, which any eliminates geographical influence. They are open because they facilitate the democratization of knowledge and have no economical or any other restrictions. They are online because they use the Internet, namely web to be managed, distributed and used. They are a course because they correspond to an adequate and clear planning with a clearly defined beginning and ending, with its participants interacting through the acquisition of new knowledge and/or upgrading of previous knowledge as well as undergoing evaluation.

Scalability is definitely one of the main features of these courses when compared to traditional courses which depend on a certain number of participants or teachers in order to start.

MOOCs can possess a complementary nature when contributing to the success of the teaching and learning process, since they pay attention to all the relevant pedagogical, technological, economic, political and legal parameters of traditional courses. This means that, if the access to technology is taken into account, as well as the adequacy of both contents and activities, the digital competences of teachers and learners, MOOCs can become a valid and useful strategy at e-learning, b-learning, m-learning and even u-learning level.

This paper is divided in several parts. At first we will clarify concepts, terminology and technologies, identifying the main types of MOOC which have emerged in recent years. We will also mention the main providers for creating, developing and implementing MOOCs.

Then we will present our case study and its different stages in order to present this new tool to a rather traditional educational system where continuous training happens either at schools or universities, due to which teachers have to sacrifice their time in travelling and staying at a given place for a given time of hours.

In order to draw attention to this new type of tool, a training MOOC was developed and implemented, called "A MOOC on MOOCs and other educational technologies".

This work aims at clarifying the contribution MOOCs can have in teacher education and at understanding the perception teachers have from their own evolution after developing and implementing their own MOOC.


## 2  MOOCS: FROM THE PAST TO THE CURRENT FUTURE

In recent years the potentialities of the Internet have been explored by organisations in general and by educational institutions in particular, which have opted for several Learning Management Systems (LMS). It can be said that the origins of MOOC date back to the beginning of the last decade when the Massachusetts Institute of Technology (MIT) launched the Open Course Ware (www.ocw.mit.edu) in order to convert the existing contents into an online digital format (class notes, videos, interactive demonstrations, exercises, exams, among others). Hence, in 2004, Creative Commons License was adopted through an open model called Open Educational Resources (OER), allowing the download and modification for non-commercial use of educational material for (re)use in the teaching and learning process.

According to Litto [8], OER increased the democratic access to knowledge and to the rationalisation of costs, promoting a new ecology of knowledge. Consequently, it boosted Connectivism as proposed by George Siemens and Stephen Downes. Connectivism focuses on education in the digital era and it takes into consideration the way technology influences the current ways of communication and learning [9].

In 2008, the first course was created under the acronym MOOC (*Connectivism and Connectivist Knowledge)* precisely by George Siemens, Stephen Downes and David Cormier. About 2,200 people attended the course interacting through a Facebook group, wikis, forums and blogs. Afterwards, several providers have emerged hosting several MOOCs among which are worth mentioning: the *Introduction to Artificial Intelligence* (2011), a course created by Sebastian Thun and Peter Norvig with about 160,000 participants from 190 countries. In April 2012, the MIT and Stanford University launched the non-profit edX project. In the same month, the course *Introduction to Computer Science* from Udacity was attended by 314,000 students. *The New York Times* considered 2012 as "*The year of the MOOC"*. The first providers of MOOCs outside the United States of America emerged only in 2013, such as: MiriadaX; Australia's Open2Study; UK's FutureLearn; Iversity, among others.

Meanwhile some criticisms and difficulties related to economic sustainability, the approval, the quality and academic efficiency contradicted the expansive trend in the context of MOOCs. Nevertheless, the Edu Trends Horizont Report from 2014 [10] explains that MOOCs are still part of the debate of an alternative in education. It is worth noting that these kind of courses can be used to reduce costs in academic institutions with financial problems. However, this should not have direct consequences on teaching staff dismissals.

MOOCs have expanded because they promise high levels of quality, personalisation and open education [11], since knowledge is shared freely without economic or demographic restrictions [12].

Face-to-face teaching and conventional education will continue to be necessary and mandatory for different areas, several contexts and different scenarios and types of audience.

## 2.1 MOOC providers and platforms

Apart from the currently existing MOOC platforms, for example, Coursera (www.coursera.org), EdX (www.edx.org), Iversity (www.iversity.org), FutureLearn (www.futurelearn.com), Khan Academy (www.khanacademy.org), Miriadax (www.miriadax.net), Open2Study (www.open2study.com), Udacity (www.udacity.com) and Udemy (www.udemy.com), it is true that any educational institution can become a MOOC provider, as soon as it develops a technological platform that supports the respective courses or it uses one of the open source existing solutions.

On the one hand, it should be mentioned that the most popular for-profit MOOC providers and platforms are Coursera, Udacity and Udemy. On the other hand, the most used not-for-profit MOOC providers are edX and KhanAcademy.

In addition, some of the most popular LMS, such as Moodle, Sakai, Docebo and Blackboard CourseSites have been adapted and used for developing and distributing MOOC courses.

The *European MOOC scoreboard* is an excellent way of dissemination that provides a database where information about MOOCs can be obtained throughout Europe (www.openeducationeuropa.eu/en/open_education_scoreboard).

This is not a comprehensive list of the MOOC providers, but only a mention to some of the most notorious ones.

## 2.2 Types of MOOCs

In the context of education and training many researchers have defended that the future of learning lies within learning contents and learning objects. In parallel, others have defended that the contexts cannot be overlooked, since these would only have value if used in learning environments. Figueiredo refers that teaching is about creating contexts where people can learn. Learning is to explore contents [13].

According to Siemens, MOOCs can be divided in two types or distinct formats: cMOOC and xMOOC. The cMOOC is centred on contexts and follows the Connectivism approach with courses based on networking [14], since its activities focus on the participant and on his relation with others in the search

for information and knowledge. The contents of the course are shared among all participants and the teacher guides, leads and helps the learning process.

On the other hand xMOOCs are extensions of conventional online courses. They follow a Behaviourist approach [15] and they focus on contexts with a more rigid organisation, somehow limiting creativity.

All in all, while cMOOCs emphasize the connection between the several participants, giving priority to the sharing of resources between all the participants, xMOOCs are based on the distribution of contents, usually through video lessons, where the teacher assumes a more relevant role.

With the growth of MOOCs in the educational universe, in particular in higher education institutions, other types have emerged, namely: aMOOCs - Adaptive MOOCs [15]; mMOOCs - Mechanical MOOCs [16] and quasi-MOOCs [17].

There are many more types and sub-types of MOOCs and it should be stressed that all the platforms and types of MOOC focus on contents or on contexts, on the number of participants (from hundreds to thousands) and on the communication strategy (synchronous or asynchronous). Besides, special emphasis must be placed on the fact that each organisation is free to create their own model of MOOC, for instance the case of iMOOC from the *Universidade Aberta* (Open University in Portugal).

Several classifications were found in the scope of our literary review. However, the main differences are placed on the role of the teachers and students in the course as well as about the way how learning is achieved [18].

## 3    THE CASE STUDY: PLANNING AND DEVELOPING A MOOC

In order to establish a difference between MOOCs and other online courses Read & Covadonga have developed a specific quality model [18] which is based on a set of characteristics that must be part of a MOOC. There hardly seems to be any consensus regarding this model, but the authors have expressed that a quality model covers "the overall structure and function of each course in terms of a variable set of characteristics that could be used to evaluate the initial design of the course, and the use of a flexible student certification model, to demonstrate, as far as is possible, that a course had achieved its objectives and had achieved the results intended by the teaching team" [18; page 48].

The set of characteristics include basic ICT competences for the participants, a course design that is different from other online courses, as we will show later in this paper. Contents and activities must clearly be different from the ones used in traditional courses (attendance or e-learning), a specific kind of interaction is demanded among participants, and analytics are available to analyze processes and access to specific contents. All of this can also be combined with questionnaires, data analysis and evaluations.

Authors who have studied MOOCs ([18]; [19]) refer to the main aspects which have to be taken into account when designing such a course. The topic should be as specific as possible, although targeted at a very broad and differentiated audience. MOOCs should also challenge the participants and that is the reason why they are learner-centered. Teachers or tutors make the contents available and may guide or supervise learners individually or in groups. The duration of these courses may vary from 25 to 125 hours and they are usually structured into 4 to 8 modules, each containing between 4 to 8 videos comprising several contents, activities and evaluation. The course should ideally also provide information on mandatory and optional tasks and, most importantly, a MOOC has to be usable across diverse technological devices, according to the profile of its learners.

As such, the characteristics of a MOOC can be reasonably placed within the framework of continuous teacher education [19], since they allow a perfect medium to achieve that end through the promotion of an active and easy participation using the Internet. A MOOC can therefore promote a training that facilitates the acquisition and development of competences, stimulate the self-regulation in the construction of knowledge, to encourage critical thinking, to boost self-evaluation by the means of self-regulated strategies and tools, as well as the autonomy and social production of knowledge.

These were the characteristics underlying the online training course "A MOOC on MOOCs and other educational technologies", which was implemented by the Polytechnic Institute of Bragança, in the northeast of Portugal, designed and implemented by all the authors of this paper.

The training was planned with the objective of attracting teachers to participate in a MOOC as an alternative form of training in a context where training happens only in educational institutions and throughout the school year. The e-learning modality of this course allowed the participants who live far

away from the traditional training centers to participate in the course and understand the advantage of online training in general and MOOCs in particular. As such the participants were given the opportunity to reflect about this new type of courses, about their design and implementation in diverse educational contexts.

# 4   METHODOLOGY

The method decided for this work was that of a case study due to the fact that it can be applied to daily situations and expanded to other contexts, as stated by Dooley [20].

In order to build this case study we designed a workshop whose aim was to help the trainees to plan and develop their own MOOC applied for their specific educational contexts using one of the many MOOC platforms and providers available.

The workshop was supervised by one trainer and two co-trainers during the month of July 2015. The sample comprised 17 trainees, 64.7% females (11 trainees) and 35.3% male (6 trainees). Of the initial group 15 trainees finished the workshop successfully. Two dropped out, one during the first, the other during the second week.

The group of participants was quite homogenous regarding their digital literacy in synchronous and asynchronous tools, which assume quite a relevance in MOOCs.

The study was assessed through questionnaires at three different stages: at the end of the training (via Udemy), at the end of the workshop (via the INTACT platform) and four months after the whole training (via Google forms). The latest were aimed at determining the usage level of the tools approached throughout the training and the intention of using them, as well as the possibility of designing and implementing a MOOC in their own educational contexts during the following school year.

Apart from questionnaires, participative observation was also used as a means to understand the ongoing trainee's reactions to their learning process, since the three trainers were key elements in a participatory action research approach. All the retrieved data were analyzed using Microsoft Excel.

# 5   DEVELOPMENT OF THE WORKSHOP

The training comprised 25 hours of distance training through synchronous sessions and 25 hours of autonomous work accompanied through asynchronous sessions and, when necessary, individual synchronous sessions were implemented.

Synchronous sessions took place online through the INTACT platform (www.intactschools.eu), more precisely  through  www.intactschools.eu/pt-pt/course/845/mooc-uma-tecnologia-educativa-do-futuro). INTACT (Interactive Teaching Materials across Culture and Technology) is an educational platform that aims to meet needs by teachers across Europe, which had not been completely satisfied until its creation due to several technical or educational drawbacks. The platform was built to support the following parameters: interactivity, compatibility and independence in relation to supporting technologies, easy access, creation of bilingual and intercultural environments of social and collaborative learning, flexibility and adaptability.

All the MOOCs were developed and housed on the Udemy platform (www.udemy.com), starting by the "MOOC on MOOCs and other educational technologies" (www.udemy.com/mooc-sobre-moocs-e-outras-tecnologias-educativas/#/), which was the starting point for all the training. Udemy is a not-for-profit platform for online learning, which allows you to create courses that can be offered either to a general or specific public.

During synchronous sessions the trainees had the opportunity to view the videos and other content, to complete the tests and clarify any doubts about the content and activities of the course. At a certain stage they submitted their own MOOC proposals and designed them taking into account the indications of trainers and other participants. In addition to encouraging participation and to ensure the monitoring of the course, these moments have contributed to the evaluation and certification of the course and workshop itself.

In the first part of the synchronous training workshop sessions, we have identified, characterized and assessed several platforms for the creation and distribution of courses on MOOC mode and have analyzed associated technologies, bearing in mind pedagogical, economic, social and legal issues.

The second part of the synchronous sessions of the course corresponded to the planning process and development of a MOOC. Synchronous sessions were also characterized by intense group discussions (both in small or large groups) through the video conferencing system Big Blue Button (BBB) embedded in the INTACT platform. The activities developed in the framework of the sessions took place in accordance with the initial planning and previously defined competences were largely achieved.

Concerning asynchronous sessions, trainees created a MOOC within their disciplinary area using the Udemy platform. They essentially produced video, audio and image content, apart from tutorials, presentations and other digital documents within the framework of their MOOC. At the end of the training workshop, they wrote a critical review describing the positive aspects and the difficulties they faced when creating the MOOC.

Moreover, the trainees were also part of a Facebook group (www.facebook.com/groups/moocese/), which facilitated contact and general information. After the completion of the training, this group has remained minimally active for the same purpose.

The training was evaluated through different parameters: it focused on tasks undertaken under the "MOOC on MOOCs" (5%), Udemy and INTACT discussion forums (5%), the presentation of a MOOC through videoconferencing (20%), individual reflection (20%) and a final project consisting of the development of a MOOC.

This final MOOC projects had a whole different evaluation. Trainees had to obey to a minimum of video content (20%), other content (10%), suitability of pedagogy versus technology (7.5%), tests (5%), surveys created in Google forms (www.google.com/forms/about/) (5%) or Survio (www.survio.com/pt/) and discussion forums (2.5%). The evaluation of the workshop was continuous, both formative and assuming a summative character at the end, with grades given in accordance to the requirements of Portuguese continuous training authorities, giving credits for teacher progression in their careers.

# 6 RESULTS

In assessing the case study, data treatment and analysis derived from collecting the opinions of the trainees about this training experience through three types of questionnaires: one at the end of the course "MOOC on MOOCs and other educational technologies" (available on the course on the Udemy provider), another at the end of the training workshop MOOC (available on the INTACT platform) and the last four months after the end of the training (available via Google forms).

The results of the first questionnaire showed that the trainees were part of age groups under 50 years of age, being 88.2% (15 trainees) under the age of 50 years and 11.8% (2 trainees) were aged over 50 years. All participants had the basic skills in ICT for attending the course. In fact, the two dropouts corresponded to two trainees who did not have the availability and the necessary Internet connections to follow the discussions through videoconferencing.

In the universe of the participants who finished the course in terms of academic qualifications, it was found that 6.66% (one trainee) had a PhD, 33.3% (five trainees) had a master degree and the remaining 60.04% (nine trainees) had a bachelor degree. It should be noted that the trainees had very different academic backgrounds in terms of disciplines.

Although about half the trainees were teachers of the 3rd cycle of basic education (Middle School) and secondary education, the training also had participants of other levels of education: kindergarten teachers, teachers of the 1st cycle of basic education (primary), teachers of the 2nd cycle of basic education, higher education teachers and trainers at other educational institutions.

All trainees considered the contents of the MOOC entirely or largely interesting, up to date, and suitable for people with different learning skills and/or with different basic training.

They also considered the design of the individual activities (posts on forums) as very good or good. The same applied to the collaborative activities proposed, videos and other audiovisual materials (graphics, short clips or interviews), as well as other available documents (articles, book chapters and other resources).

It must be stressed that all the trainees assessed the technical support provided and the answers given by trainers in messages, discussion forums and videoconference as being very good. All the trainees considered that the quizzes, games, tests and surveys were very suitable. To this end

contributed the high trainer/trainee ratio, as the trainees with a lower technological level felt they received the support they needed, both synchronously and asynchronously, provided by at least one of the trainers.

In the opinion of the trainees, the course was designed to achieve the proposed objectives, highlighting that it promoted discussion and personal reflection on the theme of the course, as well as the involvement, interaction and creativity of the participants in the course. The trainees considered that the MOOC promoted an active participation online, as well as the sharing of projects, works and similar tasks. It should be noted that all participants agreed that they learned a lot and have acquired new and important skills and competences for both their professional and personal lives.

The evaluation questionnaire filled at the end of the training workshop highlights that all the trainees considered the planning of the sessions on the level 5 or 4 (scale from 1 to 5); as well as the relevance and interest of the content; the quality of the documentation and information provided; the relevance of the documents used and the selection of the materials used; the methodologies used; the quality of the work of the trainer and of the co-trainers; the relevance of the training workshop for their professional context, whereas the same contributed greatly to their training, personal and professional development.

In addition to the content each section of the MOOC included lines of discussion in each session and the asynchronous participation in each of the forums was assessed, such as the production of the materials requested, in particular: the image and the promotional video, the summary and the whole syllabus on Udemy platform.

The choice of the Udemy platform, previously referred to, was mainly due to the fact that it did not require a formal institutional connection, and users can register themselves freely and create their own MOOCs. After the completion of the creation of the courses, the participants were subjected to the Udemy review process, which took on average 24 to 48 hours to complete. If the MOOC respected the quality standards from Udemy it was automatically published and made readily available for more than 5 million of potential learners (unless the option of private MOOC was enabled).

In short, the foreseen topics were addressed and, in the end, the proposed objectives achieved within a potentially promising and certainly innovative framework such as the training of teachers, using non-presential tools as it is customary in Portugal and certainly in other European countries. Trainees perceived the usefulness of other types of methodologies via the Internet, in particular a learning unit with lessons, audiovisual content, discussion forums and BBB videoconference sessions for synchronous sessions, in addition to the "MOOC on MOOCs and other educational technologies". After attending the course, each trainee planned and presented their own MOOC to the trainer and colleagues through a videoconference. As mentioned, the structure of the syllabus, the image and the promotional video of the MOOCs had been previously developed and published on the Udemy platform. The syllabi of the MOOCs seem to have a relevant interest for the innovation of school practices or, at best, to constitute a complementary space for the students in school contexts. Topics of value to the transformation of teaching practices, with a view to its adaptation to the teaching-learning processes that currently fall into deep change contexts, were also discussed.

Although the workshop was carried out at the end of the school year (July), which is usually full of several school meetings, marking and exams, as well as any closure of projects and of the school year, the overall assessment is that the workshop went smoothly and was exceptional.

Four months after the end of the training, a final questionnaire was carried out to measure the level of use of the MOOCs and the tools debated during the training. The answers to this questionnaire indicated the intention of preparing, creating and using MOOCs in classroom contexts during the following school year.

## 7   CONCLUSIONS

Although MOOCs are criticized by some and praised by others, the fact remains that they are trending as an educational novelty, especially due to the fact that they offer such a huge potential in pedagogical terms in the new digital environment of the 21st century.

In this era of rapid technological development educational institutions should reflect about the use of MOOCs as a support for the traditional teaching and learning environment, and also as a means to attract other types of audiences, who would otherwise have no access to the knowledge shared through a MOOC, thus contributing to a wider network of knowledge and collaboration.

Since educator and other professionals in the field of Education have little time and money to attend mandatory trainings, MOOCs can certainly become an alternative and a valid contribution for the improvement of teacher education and to enhance the competences required in a new digital era.

The training which we have presented has reached the proposed objectives, both on the synchronous and asynchronous level. It was operationalized through the development of collaborative tasks and critical reflection in small and larger groups.

The trainees have considered that the contents did have quality and were adequate to their expectations. Apart from that, they revealed interest and motivation, thus recognizing the training workshop as a valid contribution to their professional and personal growth.

This was not the first online teacher training action in Portugal, but it was certainly groundbreaking in the field of an online workshop on MOOCs through the use of a MOOC itself.

The results we have presented show that MOOCs can undoubtedly be a valid contribution in teacher education because they facilitate the access to training, minimizing geographical and time barriers.

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