

# Designing your first MOOC from scratch: recommendations after teaching “Digital Education of the Future”

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**Abstract:** Massive Open Online Courses (MOOCs) have been a very promising innovation in higher education for the last few months. Many institutions are currently asking their staff to run high quality MOOCs in a race to gain visibility in an education market that is beginning to be full of choices. Nevertheless, designing and running a MOOC from scratch is not an easy task and requires a high workload. This workload should be shared among those generating contents, those fostering discussion in the community around the MOOC, those supporting the recording and subtitling of audiovisual materials, and those advertising the MOOC, among others. Sometimes the teaching staff has to assume all these tasks (and consequently the associated workload) due to the lack of adequate resources in the institution. This is just one example of the many problems that teachers need to be aware of before riding the MOOC wave. This paper offers a set of recommendations that are expected to be useful for those inexperienced teachers that now face the challenge of designing and running MOOCs. Most of these recommendations come from the lessons learned after teaching a nine-week MOOC on educational technologies, called “Digital Education of the Future”, at the Universidad Carlos III in Madrid, Spain.

## Introduction

Higher education institutions are overwhelmed by the appearance of Massive Open Online Courses (MOOCs), which are a disruptive alternative to traditional education (McAuley et al. 2010) that has become very popular in the last few months. MOOCs enable teachers and institutions to provide high quality courses, generally free of charge, to students worldwide. Many MOOC initiatives have recently emerged across the globe, such as Coursera, edX and Udacity in the United States, FutureLearn in the United Kingdom, iversity in Germany, FUN in France or MiríadaX in Spain.

MOOCs entail several challenges for institutions and educators. New teaching methods (Kop et al. 2011, Sharples et al. 2013) and assessment methodologies for large groups of students (Sandeén 2013), appropriate certification mechanisms (Cooper 2013), and solutions to include MOOCs in current higher education structures (Fox 2013) are examples of MOOCs open research challenges that still need to be addressed. Another of these open challenges concerns the design of MOOCs. MOOCs are very demanding compared to traditional courses and therefore efforts should be made at design time to plan them properly. For instance, Kolowich (Kolowich 2013) estimated the workload of making a MOOC from scratch to be 100 hours, plus 10 more hours weekly on upkeep. This workload depends, for instance, on the duration of the course, the kind of materials that need to be generated, and teacher involvement in discussions about the course topics in the social tools of the MOOC. In any case, this additional burden is not acceptable in most universities, where educators typically already handle traditional teaching and research duties.

Some strategies to reduce this burden are to seek help from institutional services, to reuse open content generated by third-parties, to limit the number of social tools that are supported during the course, or to share the teaching of the MOOC with other colleagues (König 2013). But these are just a few examples of design decisions that must be taken before launching a MOOC. In fact, a well-thought design is essential to minimize the risk of trying to run overambitious MOOCs. This design should be agreed upon by the teaching staff and take into account previous experiences of other teachers that have created MOOCs in the same area. There are already several frameworks in the literature, such as the MOOC Canvas (Alario-Hoyos et al. 2014) or the design and evaluation framework (Grover et al. 2013) aimed at helping teachers reflect on and discuss the issues and dimensions that surround the design of MOOCs.

This paper brings the experience of the professors that participated in the creation and running of a nine-week MOOC on educational technologies, deployed on the platform MiríadaX in early 2013 and called “Digital Education of the Future” (DEF – “Educación Digital del Futuro” in Spanish). The aim of this paper is to advise teachers and institutions with no experience in running MOOCs, by indicating the main design decisions that were taken in DEF and how these decisions were received by the different stakeholders. The decisions that were most highly assessed and the lessons learned are provided as recommendations for the community of MOOC teachers.

## “Digital Education of the Future”

“Digital Education of the Future” (DEF) ([https://www.miriadax.net/web/educacion\\_digital\\_futuro](https://www.miriadax.net/web/educacion_digital_futuro)) was a multidisciplinary MOOC on educational technologies delivered at the Universidad Carlos III de Madrid from February to April 2013. DEF was created from scratch, since professors wanted to offer a MOOC that addressed the latest trends that are changing the education system. All the contents and activities in DEF were generated a few weeks before the course started. This approach has two counterparts. On one hand, this kind of MOOC satisfies those that want to learn about the latest in the area and cannot do so through traditional undergraduate or postgraduate programmes, which are less able to quickly adapt to the latest trends. On the other hand, this kind of MOOC requires a big effort, as it involves generating a lot of new materials from scratch in a short time. Furthermore, a MOOC that addresses recent trends could quickly become outdated, which implies a serious burden when updating the materials (particularly the video lectures).

Five professors participated in the design and deployment of the MOOC. The fact that five people were part of the teaching staff allowed for sharing of the teaching workload of the MOOC and made it possible for everyone to contribute to the areas where they were experts. On the negative side, there was an extra non-negligible coordination effort to make decisions on how to design and run the MOOC. There was also a full-time facilitator in charge of solving questions related to the less academic aspects of the course, fostering debate on social networks around the MOOC and acting as intermediary between professors and participants.

DEF was created within a Higher Education institution and therefore it had the support of several services belonging to the University. Among them, audiovisual technicians helped record some of the more elaborate videos, advised on the recording of video lectures (e.g. lighting, sound quality...), and did the video post-production (e.g. adding the University logo to them). Also, library staff helped subtitle all the video lectures, which turned out to be a very burdensome task. Subtitling may seem unnecessary for some MOOCs, especially when most participants speak the language natively (as was the case in DEF). However, noises or linguistic differences between countries may hinder proper understanding of the explanations, and this can easily be addressed by transcribing the speech.

DEF was delivered in Spanish, targeting a Hispanic audience - a market for which there were very few MOOCs in February 2013 compared to those for English speakers. The teaching staff decided to deploy DEF on the platform MiríadaX, which was developed a few weeks before by Telefónica Learning Services and Universia, to allow higher education institutions from Spain and Latin America to deploy MOOCs in Spanish.

DEF was structured in three modules, the first of which addressed the use of educational technologies from the pedagogical point of view, and the other two from the technological point of view. In particular, the first module covered the concept of interaction and its evolution through the years in parallel with the development of new hardware devices and interfaces. The second module addressed the use of mobile technologies in education (m-learning), presenting the most current technologies, applications and projects in the area. The third module explored the MOOC world, delving into the generation of multimedia contents as well as into the most common assessment methods, gamification strategies and learning analytics approaches that could be found in MOOCs at that time.

Each module was divided into three lessons, and each lesson was delivered in a different week (9 weeks in total). Each lesson contained nine video lectures of about ten minutes long, a multiple choice test at the end of each video, a multiple choice test at the end of each lesson, and recommended readings (i.e. links to related information selected by the teaching staff). At the end of each module, participants had to carry out an individual assignment that was peer reviewed. At the end of the course, participants had to fill out a multiple choice test with questions about the three modules. There was also a presentation module (“module zero”), which was released one day before the MOOC started. The purpose of the “module zero” was to introduce the course and provide general information about the course structure, the assessment system, the use of the platform, and the social tools offered through the MOOC. Figure 1a shows the structure of one of the lessons in DEF.

Learning contents were offered in the form of video lectures. On the grounds that the platform did not support video hosting, all videos were uploaded to YouTube, linked to MiríadaX, and preceded by a brief description. DEF professors always appeared in the videos, although two different formats were employed in these videos. Most videos in module 1 had the teacher explaining in the foreground with an illustrative picture in the background. Most videos in modules 2 and 3 had the teacher explaining in the lower right corner with supporting slides in the background; these supporting slides were uploaded to MiríadaX as PDFs, so that participants could use them to review the concepts explained. There were also weekly interviews with national and international experts in the area to complement the lectures. Figure 1b shows an example video lecture from module 3, with a short description of the video on top, and a link to a PDF file with the slides to be downloaded by the MOOC participants at the bottom.

The assessment system included formative assessment activities and summative assessment activities. Formative assessment activities could be completed at any time, but summative assessment activities had to be completed at

scheduled intervals according to the calendar published during the first week of the course. Specifically, the multiple choice tests after each video lecture were part of the formative assessment, providing immediate feedback to the participants about the concepts explained in the related video. The end-lesson multiple choice tests were part of the summative assessment, with a maximum score of 5 points each (9 tests). The end-module peer assessment activities were another part of the summative assessment, with a maximum score of 10 points each (3 activities). The final multiple choice test was also part of the summative assessment, with a maximum score of 25 points. In total, participants could get up to 100 points in DEF. They needed 50 points to pass the course. The selection of an assessment system based only on multiple choice tests and peer assessment activities was conditioned by MiríadaX, as these were the only two assessment tools offered by the platform at the time when the MOOC was run. At the end of the course, certificates of participation were provided with participants' final scores. These certificates included a clause in which it was explicitly stated that it had not been possible to verify the users' identity or the authorship of works.

In addition, five social tools were employed during DEF to promote social learning, foster discussion and share additional materials. Two of these social tools were natively provided by the platform MiríadaX (built-in social tools), and three others were provided by third-parties (external social tools). The two built-in social tools were Questions and Answers (Q&A) and a forum. The three external tools were Facebook, Twitter and MentorMob, which is a tool for sharing lists of resources related to a given topic. Of the five social tools, the forum was the one with a highest number of contributions, although there were also large communities of participants around Facebook, Twitter and Q&A (Alario-Hoyos et al. 2013). Three other non-social tools were also employed by the teaching staff during DEF: Storify to share a collection of the most relevant tweets each week, a built-in blog to post announcements and the latest news related to the course, and Google Drive to deliver questionnaires related to participants' profiles, performance and degree of satisfaction with the MOOC.

## Recommendations after teaching DEF

Recommendations from the professors after teaching DEF are collected in Table 1, highlighting in bold the most important ones. Recommendations are organized in the following eight categories: (1) Platform, (2) Overall Course Structure, (3) Teaching Staff, (4) Learning Contents, (5) Assessment, (6) Social Support, (7) Certification, and (8) Other Related Aspects.

## Conclusions and future work

This paper has presented a set of recommendations distilled from the experience of the professors involved in the design and running of a MOOC about educational technologies called Digital Education of the Future. The most important recommendations are: to carefully study the features offered by the platform in which the MOOC will be deployed; to not underestimate the time needed for the preparation of learning materials (particularly video lectures), or for their upload to the platform; to support the discussions and queries in social tools, but indicating from the beginning the degree of commitment of the teaching staff (in order to reduce the number of complaints from participants); and to advertise the course as soon as possible, making use of social tools and creating attractive campaigns in order to catch the attention of potential participants. Such aspects increase the complexity and workload of creating a MOOC from scratch, demanding teachers make more reflections and agreements at design time.

Of course, this is a particular example MOOC, and thus MOOCs in other areas that are deployed on different platforms should be analyzed in order to confirm and extend the recommendations presented in this paper. The ultimate aim is to create a community of practitioners that define generic best practices for designing and running MOOCs.

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Figure 1: Screenshot of the MOOC “Digital Education of the Future” deployed in MiriadaX: a) Structure of one of the weekly lessons (module 3, lesson 1); b) Example of video lecture with the teacher in the lower right corner and slides in the background; c) Built-in social tools supported by the platform MiriadaX (Q&A and forum).

Table 1: Recommendations after teaching DEF, design decisions in DEF and additional related notes

	Recommendations	Design decisions in DEF	Notes
<b>Platform</b>	To choose the MOOC platform based on 1. institutional agreements with popular initiatives or 2. target learners.	At design time, there were no institutional agreements between Universidad Carlos III de Madrid and major MOOC initiatives. Teachers selected MiriadaX in order to target the Hispanic community of learners.	More than 100,000 learners (mainly from Spain and Latin America) were registered in MiriadaX at the time DEF started. 57 courses from 18 universities were simultaneously taught in MiriadaX from February 2013 to April 2013.
<b>Overall Course Structure</b>	To study the platform constraints before creating the course structure and learning materials.	MiriadaX constrained the type of assessment activities that could be added to the course and led to the use of YouTube to host video lectures.	-
	To be aware of the workload required for the creation of the course structure and the upload of learning materials to the platform.	The teaching staff and the supporting facilitator shared the burden associated with the creation of the course structure and the uploading of learning materials.	Setting the course in the platform once the learning materials were generated represented an additional workload of 15-20 hours due, among other things, to the lack of features to automatically upload multiple choice tests.
	To define a flexible schedule so that interested latecomers can still enroll in the course.	Users could join the course while it was being taught. Summative assessment had a greater weight towards the end of the course, so that participants who registered up to 5 weeks late could still pass the course.	On day 1 there were 3105 registered users with 5455 participants after week 6 and 5595 participants at the end of the course. Latecomers could follow the course normally, accessing all previously released materials.
<b>Teaching Staff</b>	To have several teachers, which enriches the contents, allows greater heterogeneity of topics and splits the workload, but demands a more complex coordination.	Five professors with different backgrounds on humanities and engineering participated in the course. One of the professors played the roles of coordinator and director of studies.	The heterogeneity of topics attracted people from different backgrounds: 32% of learners had some technical background, 31% some background on humanities, and 46% some background in education.
	To moderate the participation and awareness of the teaching staff by sending regular e-mails reporting the pending tasks and latest news.	The facilitator was responsible for sending regular communications, and acting as a link between learners and the teaching staff.	Every professor agreed that the inclusion of regular communications was necessary to be aware of what was happening in the course and to have continuous contact with the participants.
<b>Learning Contents</b>	To create original video lectures explaining the concepts easily and clearly, with appropriate tone.	Professors employed videos of about ten minutes each. The advantages and shortcomings of different video formats were studied before starting to record. Video interviews with experts gave deeper insight.	MOOC participants reported overall positive comments about the video lectures and the explanations of professors.
	To use additional materials that learners can follow easily to complement teachers' speech and study offline (e.g. slides).	Videos in modules 2 and 3 employed supporting slides, following an agreed template. Explanations in module 1 were accompanied by a supporting book.	69% of the people preferred a video format based on slides with the teacher in a corner, while 23% of them preferred the teacher in the foreground without slides.
	To plan when video lectures need to be ready, leaving enough extra time to add subtitles. Not to underestimate the time required to generate videos.	Videos in modules 1 and 2 were created with a few weeks in advance. Videos in module 3 were created with a lower time frame. All videos were subtitled for easier understanding.	Professors estimated the time to record 10 minute videos to be 60-90 minutes, including preparation of the speech, recording the video, correcting errors, and setting and checking the final version.
<b>Assessment</b>	To define the competences that participants must acquire during the course.	Competencies were defined beforehand and included ICT competencies, time management and self-discipline. Learning objectives matched these competencies.	-
	To define formative and summative assessment activities from the beginning. To inform clearly on assessment policies, and how final scores will be calculated. To provide immediate feedback.	Participants needed 50 out of 100 points to pass the course. In each module they could get 25 points considering the end-lesson multiple choice tests and the peer review activities, plus another 25 points in the end-course multiple choice test.	There were no complaints about the general assessment policies. There were some complaints about the tight schedules to resolve the assessment activities. Professors detected some participants revealing the answers to tests in the social tools. This suggests the need for more efficient assessment mechanisms in MOOCs.

	Recommendations	Design decisions in DEF	Notes
Social Support	To promote social learning. Giving support to several social tools is burdensome for teachers, but allows people to choose the tools they feel most comfortable with.	Five social tools were supported and people employed them for different purposes (e.g. forum and Facebook for discussions, Twitter and MentorMob to share extra materials and Q&A to post queries related to the course).	The forum was the most popular tool for learners to contribute and participate in discussions, followed by Facebook, Q&A and Twitter (Alario-Hoyos et al. 2013). MentorMob did not receive the attention expected by the teaching staff.
	To define from the beginning the degree of teachers’ commitment regarding their activity with the social tools, and announce it to participants.	There was a facilitator dedicating about 3-4 hours per day on weekdays, and 1 hour per day on weekends. Professors hardly interacted directly with social tools but were informed about the hot topics by the facilitator.	Despite the dedication of the facilitator, participants complained, particularly at the beginning of the course, about the lack of support by teachers in social tools.
Certification	To define from the beginning the type of recognition people will get for completing the course, what they will need to obtain such recognition and when they will receive it.	Participants got a certificate if they had obtained 50 or more points out of 100 at the end of the course. The certificate included the name of the course and University. Nevertheless, the certificate also had a clause indicating that it had not been possible to verify the identity of the learner or the authorship of works.	Many questions regarding certification were posted in social tools, especially at the beginning of the course. The teaching staff had doubts about this issue until the end of the course, because the platform was responsible for generating and distributing the certificates.
Others	To establish and start the marketing strategy as soon as possible, since registrations steadily increase even after the course begins.	The marketing strategy was carried out by MiríadaX, Telefónica Learning Services and Universia, especially through social networks and media, and took place during the month prior to start of the course.	32% of registered users found out about the course in social networks, 22% of them through advertising campaigns on the Web, and 37% of them through friends and colleagues.

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