Recommendations for the Design and Deployment of MOOCs: Insights about the MOOC Digital Education of the Future Deployed in MiríadaX

Carlos Alario-Hoyos, Mar Pérez-Sanagustín,
Carlos Delgado Kloos, Pedro J. Muñoz-Merino
Department of Telematic Engineering,
Universidad Carlos III de Madrid, Av. Universidad 30
28911, Leganés (Madrid), Spain
{calario, mmpsanag, cdk, pedmume}@it.uc3m.es

ABSTRACT

This paper reports the insights of the experience of designing and deploying the MOOC Digital Education of the Future, which was deployed in the platform MiríadaX in early 2013. This MOOC was delivered by several professors from the Universidad Carlos III de Madrid and was supported by several external social tools that promoted the creation of a community of learners as part of it. The contribution of this study is a list of insights and recommendations about both the design and deployment of MOOCs. These insights and recommendations are built upon those presented in previous works by the authors. The design recommendations include information about the overall course structure, the assessment activities, the certification of the course, and the use of complementary social tools. The deployment recommendations mainly focus on the role of the teaching staff when running the course and on the importance of social tools and communication tools as a mechanism for participant engagement throughout the course. These recommendations aim to be useful for other practitioners, instructional designers and policy makers addressing the challenge of designing and deploying a MOOC from scratch.

Categories and Subject Descriptors

K.3.1 [**Computer Uses in Education**]: Distance Learning. K.3.2 [**Computer and Information Science Education**]: Information systems education

General Terms

Design, Management, Experimentation.

Keywords

Massive Open Online Courses (MOOCs), design, deployment, insights, recommendations, social tools.

1. INTRODUCTION

In the past two years, an important innovation in Higher Education has come from the hand of Massive Open Online

Courses (MOOCs). Since the appearance of MOOCs a couple of years ago, many institutions have spent lots of efforts in order to join the MOOC hype, keeping up as competitive universities, and reaching a higher visibility worldwide. But, being part of this trend means changes on these institutions regarding their structures, policies, pedagogies and didactics with the aim of moving from teaching traditional face-to-face courses to teaching online, massive and open courses. Initiatives such as edX, Coursera, MiríadaX, Udacity, FutureLearn, iversity, FUN, XuetangX, and many others, are supporting this change in education.

Currently, it is possible to find in the literature some reports and papers that collect recommendations and insights from teachers, instructional designers and policy makers belonging to different institutions worldwide that have already experienced the challenges of designing and deploying MOOCs in different platforms. For example, authors in [5] [6] [14] report the results of the MOOCs run by Duke University and the University of Edinburgh in the Coursera platform. Authors in [9] show the data of a MOOC on electronics deployed in the UNED COMA Spanish MOOC platform. Finally, authors in [7] present the results of the first French MOOC deployed in the Canvas.net platform. Over the months, new papers are expected to be published with best practices that teachers can eventually apply in their MOOCs

This paper complements existing reports addressing the experience of designing and deploying MOOCs by presenting a set of insights and recommendations extracted after designing and running the MOOC Digital Education of the Future (DEF), which was deployed in the Spanish MOOC platform MiríadaX by Telefónica Learning Services. The set of insights and recommendations presented in this paper build upon the data and conclusions presented by the authors in previous papers [1] [2] [3] [8], which focused on analyzing different aspects of DEF.

The rest of the paper is structured into three more sections. Section 2 presents the processes of designing and deploying the MOOC DEF, indicating their main insights. Section 3 organizes the recommendations extracted from DEF, differentiating between those related to the design of the course and those related to the deployment of the course. Finally, Section 4 summarizes the main conclusions of the paper.

2. INSIGHTS ABOUT DEF

This section describes the main insights of the MOOC Digital Education of the Future (DEF). For a better understanding, these

insights are organized in two subsections: DEF design and DEF deployment.

2.1 DEF Design

The MOOC DEF (see its logo in Figure 1) was a course on educational technologies, delivered by five professors and teaching assistants from the Universidad Carlos III de Madrid (Spain). The course was taught in Spanish and lasted nine weeks (from February to April 2013) and covered some of the most trending topics in the field of educational technologies from a multidisciplinary perspective.

Figure 1: DEF logo as appears in MiríadaX

Specifically, the MOOC was organized into three modules, one for each topic: (1) Human Computer Interaction, (2) Mobile Learning and (3) New trends in Online Education (including MOOCs). There was also a short presentation module ("module zero"), which was released one day before the course started with the aim of introducing students the main aspects of the course, such as the teaching staff, the platform, or the social component. Each module was divided into three lessons (each lesson corresponded to one week of the course and there were 3 weeks per module). Each lesson was typically composed of 9 video lectures of about 10 minutes each. Video lectures were complemented with, at least, one reading per lesson and a set of formative and summative assessment activities. Formative activities were multiple-choice tests at the end of each video lecture. Summative activities were of three types: multiple-choice tests at the end of each lesson, individual peer review assignments at the end of each module, and a final multiple choice test at the end of the course.

Students needed 50 points out of 100 to pass the course. Only the summative assessment activities were taken into account for calculating students' final scores. Each multiple-choice test at the end of each lessons weighted a 5% of the final score (45% in total for the three modules). Each peer-review activity weighted a 10% of the final score (30% in total for the three modules); 5% was given when students completed the assignment and the reviews assigned by the system, and 5% was computed as the average of the scores given by the peers who reviewed the assignment.

Finally, the end-course test weighted a 25% of the final score. Since the registration of the course was open from the beginning to the end of the course, this assessment structure was designed to give latecomers (people arriving once the course had started) the opportunity to pass the course [1], even if they had missed some of the first summative assessment activities. Figure 2 summarizes the course structure and the distribution of the summative assessment activities.

2.2 DEF Deployment

DEF was deployed in MiríadaX, a Spanish platform that had just been created by Telefónica Learning Services and Universia. At the time when DEF was designed, this platform only offered the possibility of uploading documents and video lectures (hosted in YouTube and afterwards linked to the platform) as the main learning resources. In addition, this platform only offered the possibility of adding multiple choice tests and peer-review assignments as assessment activities. There were also two built-in social tools supported by the platform aimed at fostering students' participation and collaboration: a Questions & Answers (Q&A) tool, and a forum. These constraints caused that the design presented in the previous subsection had to be refined and adapted to meet the types of formats, assignments and tools that could be supported by the platform.

Table 1. Summary of the deployment of DEF indicating the behavior of participants and their degree of participation in the (built-in and external) social tools.

Course Participation		
Lurkers		3,838
Participants that do not complete the course		1,332
Participants that complete the course		425
Total participants registered		**5,595**
Final Scores		
Participants that failed the course		5,139
Participants that passed the course		456
Participation in social tools		
	Number of people posting	*Number of posts*
Q&A	339	604
Forum	800	2,814
Facebook	341	664
Twitter	173	659
MentorMob	34	45

*Data extracted from tables 2, 3 and 5 in [1], in which more details about the participation and scores distribution are given.
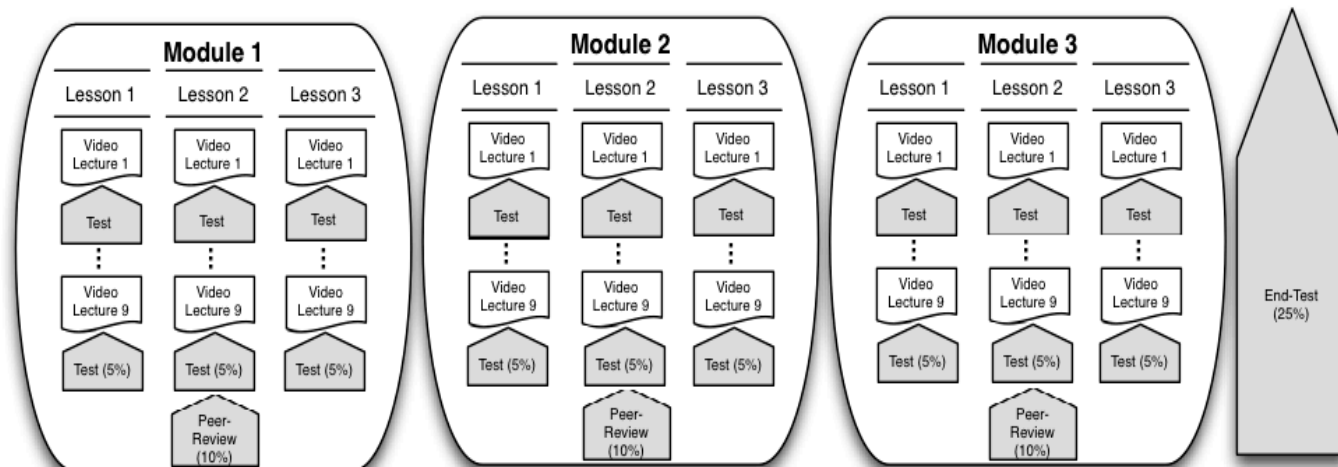
Figure 2: Structure of DEF, including video lectures, formative tests (not taken into account to calculate students' scores), summative tests and peer-review activities.

Since several studies point out the importance of social tools for supporting connections among MOOC participants and promote the "sense of community" [12;13], the teachers decided to add three extra external social tools to the MOOC: Facebook, Twitter, and MentorMob [1;3]. Students could consult and contribute in these three external social tools at any moment. Facebook, Twitter and MentorMob complemented the two social tools supported by the platform (Q&A and forum). Facebook was mainly used to send announcements related to the course, elaborate on small discussions and share some complementary materials. Twitter was also used by the teachers to send short announcements, and students preferred this social tool to share links of interest and disseminate quotations extracted from the video lectures [1;3]. Finally, MentorMob was employed by the teachers to create collections of websites and materials related to the different modules and to invite students to contribute with additional resources, although its impact was very limited receiving very few contributions.

Table I summarizes the behavior of participants and their scores, specifying also the number of contributions registered in each of the five social tools and the number of participants that contributed in each social tool. Further details about these figures can be found in [1].

3. RECOMMENDATIONS EXTRACTED FROM DEF

This section draws a set of recommendations extracted from DEF and the most recent literature on MOOCs. These recommendations are organized in two subsections: recommendations for the design of MOOCs and recommendations for the deployment of MOOCs.

3.1 Recommendations for the design of MOOCs

Although, as pointed out by several studies, most design decisions are typically constrained by external issues, such as the number and type of institutional resources available, the platform with which the institution has an agreement for the deployment of MOOCs (if any) [4], or the characteristics of target learners [15], we detected some general recommendations distilled from our experience with DEF that may be useful for those addressing the design of a MOOC from scratch. These recommendations are classified into six categories: selection of the platform, course structure, course contents and activities, course logistics, accreditation and social components.

I. *Selection of the platform.*

(1) Select the platform according to the institutional agreements with MOOC initiatives; otherwise take into account the target learners and the pedagogical purposes. If your institution does not have any agreement with an existing MOOC initiative, we recommend exploring the target learners' community to understand what the most popular platforms in such community are. For example, a recent study about the MOOC adoption in Spain indicates that MiríadaX is the platform that has been chosen by most Spanish Universities to deliver MOOCs in order to gain visibility in the markets of Spain and Latin America [16]; equivalent results can be found in other countries for the national platforms, such as FutureLearn in the UK. In contrast, some MOOCs, especially the so-called connectivists MOOCs (or cMOOCs) [17], are more focused on generating synergies among the course participants than on delivering a set of materials and assessment activities for individual purposes centralized in a single platform. If this is the case, we recommend looking for flexible learning environments, such as blogs, wikis or Personal Learning Environments, designed with a special emphasis on social support.

II. *Course structure.*

(1) Analyze the platform affordances (and constraints) before designing the MOOC. Before designing the course contents and the assessment activities, we recommend checking out what the affordances and constraints of the platform are, such as the type of assignments and resources it supports.

(2) Define the duration of the course from the very beginning and distribute the topics to be covered among different

modules with a homogeneous structure. If possible, distribute also the workload among different teachers to maximize the possibilities of success. For usability reasons, we recommend to structure the different course modules in the same way, so that the students can better plan and organize their study. This is also true for the cases in which different teachers participate in the delivery of a MOOC.

(3) Define an integrative assessment structure. In order to increase the number of participants that follow (and eventually complete) the course, we recommend designing a flexible evaluation structure that facilitates latecomers to be able to pass the course.

(4) Create an attractive "About Video". The "about video" is the presentation or "teaser" video that introduces the course and is used to attract participants' attentions. We recommend being original and taking risks when recording this video. The "about video" does not only represents the teachers delivering the MOOC, but also the University, and can act as a brand. The "about videos" for the different courses of the same University can have a similar structure; but they should be adapted to teachers' needs.

III. Course contents and activities.

(1) Create original video lectures between 5-10 minutes. According to a recent study [10], shorter video lectures are more engaging than longer video lectures since students' attention sharply decreases with time after a threshold of 5-10 minutes. This is especially true in videos that demand a high concentration as compared to those that have more informative intentions.

(2) Choose charismatic teachers as the main actors of the video lectures. Results in [10] indicate that videos with charismatic and enthusiastic instructors are more engaging. Do not force teachers to behave in an unnatural way in front of the camera. Exploit their main features and, alternatively, choose other teachers with a better presence for the video lectures.

(3) Combine videos of different types and provide guidelines with examples to support teachers in the creation of video lectures. Video lectures can be of different types [10]: recording of lectures, "talking head" with slides or a blackboard, digital drawing (tablet capture), animated slide presentations, or combinations of all these types. We recommend checking out what videos are better for transmitting a particular idea and providing examples to teachers in order to inspire the video production. As an example, you can check the guidelines provided by the University of Toronto [19] and by the Unit for Educational Technology and Innovative Teaching of the Universidad Carlos III de Madrid [18].

IV. Course logistics.

(1) Analyze the workflow required to create the course structure and the course materials. Be aware of the time required for creating and uploading the materials and help teachers and designers plan the content and activity development. Leave enough time in advance for testing the materials before releasing them to the world.

(2) Plan a schedule for teachers and designers taking into account their availability and the availability of the institutional resources that need to be used for the content creation. Usually, there are several teachers involved in the

content creation. To facilitate their coordination and to maintain their motivation for meeting the deadlines, we recommend sending regular reports about the state of the course and the advances on the content creation. That increases the awareness and also the pressure for the creation of the remaining materials on time.

(3) Define a "course manager" that supports and coordinate all the stakeholders involved in the MOOC, from the design stage until the end of the course. During DEF, many stakeholders were involved, including not only the five teachers, but also administration staff and technical staff. The course manager should be in charge of supporting and planning the whole MOOC development, as well as facilitating the communication among the different stakeholders.

V. Accreditation

(1) Decide from the beginning the type of accreditation (if provided) that participants will receive after completing the MOOC. The kind of accreditation participants will receive is typically one of the most controversial issues and therefore needs to be clarified from the very beginning. Decisions about the type of accreditation usually depend on the specific MOOC platform. Check the possibilities and agree with the University policy makers the type of accreditation that will be provided.

VI. Social components

(1) Offer several (built-in and external) social tools in order to get different outcomes and levels of participation. Empirical results suggest that including a variety of social tools promotes the engagement of participants with different profiles and the creation of a community of learners, and facilitates obtaining different outcomes [1;11]. Nevertheless, increasing the number of social tools requires also a trade-off, since critical information may be diluted in the many threads that are created in the different social tools. If so, teachers should devote extra time to locate this critical information, placing it in a visible area.

3.2 Recommendations for the deployment of MOOCs

From the deployment of DEF, we identified a set of general recommendations that may be useful for those addressing the deployment of a MOOC. These recommendations are classified into two categories: evolution of the course, and engagement of participants

I. Evolution of the course

(1) Keep a record of problems in a document you share with the different stakeholders. During the course, several unexpected problems (technical, pedagogical, logistical…) may occur. Register these problems and how you solved them to facilitate the deployment of new MOOCs in the future.

II. Engagement of participants

(1) Maintain a high activity in the social tools to engage students. Results in [3] show that an increment of teachers' activity in the social tools results into an increment of students' activity. If teachers stop contributing in social tools, students will eventually stop too.

(2) Send weekly notifications to the students. Sending weekly reports about the course progress and topics is a way to maintain contact with students and getting their attention on the course. Nevertheless, be aware of the frequency of messages since too many messages may stress students and discourage them from following the course.

(3) Detect "leaders" and "trolls" in the social tools. Sometimes, there are users that contribute with "wrong" content or content unrelated to the course topics. These users are so-called "trolls" and should be removed from the course as soon as possible. On the other side, there are users that are very active during the whole curse and act as "leaders". Teachers can refer to the contributions submitted by the latter to promote the participation of their peers.

4. CONCLUSIONS

This paper has presented a set of insights and recommendations for both the design and deployment of MOOCs drawn from the experience of the MiríadaX MOOC Digital Education of the Future, and the most recent literature. Regarding the design, recommendations were related to the course platform, structure, content and activities, course logistics, accreditation and social components. Regarding the deployment, this article provides recommendations for controlling the evolution of the course and engaging participants through social tools. This recommendations and insights are expected to be useful for those teachers that now face the challenge of designing and developing a MOOC from scratch.

5. ACKNOWLEDGMENTS

6. REFERENCES

[1] Alario-Hoyos, C., Pérez-Sanagustín, M., Delgado-Kloos, C., Parada, G., H.A., and Muñoz-Organero, M., (in press). Delving into participants' profiles and use of social tools in MOOCs, *IEEE Transactions on Learning Technologies*.

[2] Alario-Hoyos, C., Pérez-Sanagustín, M., Delgado-Kloos, C., Gutiérrez-Rojas, I., Leony, D., and Parada G., H.A., 2014. Designing your first MOOC from scratch: recommendations after teaching 'Digital Education of the Future', *eLearning papers, From the field,* 37, 3, 1-7.

[3] Alario-Hoyos, C., Pérez-Sanagustín, M., Delgado Kloos, C., Parada G., H.A., Muñoz-Organero, M., and Rodríguez-de-las-Heras, A., 2013. Analysing the impact of built-in and external Social Tools in a MOOC on Educational Technologies, *Proceedings of the 8th European Conference on Technology Enhanced Learning, EC-TEL 2013,* LNCS 8095, 5-18.

[4] Alario-Hoyos, C., Pérez-Sanagustín, M., Cormier, D., and Delgado Kloos, C., 2014. Proposal for a Conceptual Framework for educators to describe and design MOOCs, *Journal of Universal Computer Science (JUCS)*, 20, 1, 6-23.

[5] Belanger Y., and Thornton, J., 2013. Biolelectricity: A quantitative approach: Duke University's first MOOC, *Technical Report*. Retrieved from: http://dukespace.lib.duke.edu/dspacebitstream/handle/10161/6216/Duke_Bioelectricity_MOOC_Fall2012.pdf

[6] Building a Coursera Course v 2.0, 2013. *Technical Report*, Duke Center for Instructional Technology. Retrieved from: http://bit.ly/dukecoursera

[7] Cisel, M., 2014. Analyzing completion rates in the First French xMOOC, *eLearning papers, From the field*, 37, 6, 1-9.

[8] Delgado Kloos, C., Muñoz-Merino, P., Muñoz-Organero, M., Alario-Hoyos, C., Pérez-Sanagustín, M., Parada G., H.A. Ruipérez, J.A., and Sanz, J.L., 2014. Experiences Running MOOCs and SPOCs at UC3M, *Proceedings of the 2014 IEEE Global Engineering Education Conference,* EDUCON, 884-891.

[9] Díaz, G., García Loro, F., Tawfik, M., Sancristobal, E., Martin S., and Castro, M., 2014. Learning Electronics through a Remote Laboratory MOOC, *Proceedings of the European MOOC Stakeholder Summit 2014, EMOOCs,* 214-217.

[10] Guo, P.J., Kim, J., and Rubin, R., 2014. How video production affects student engagement: An empirical study of mooc videos, *Proceedings of the ACM conference on Learning @ scale*, 41-50.

[11] Kop, R., Fournier, H., and Mak, S.F.J., 2011. A pedagogy of abundance or a pedagogy to support human beings? Participant support on massive open online courses*, The International Review of Research in Open and Distance Learning*, 12, 7, 74–93.

[12] McAuley, A., Stewart, B., Siemens, G., and Cormier, D., 2010. The MOOC Model for Digital Practice, *Technical Report*, University of Prince Edward Island. Retrieved from http://elearnspace.org/Articles/MOOC_Final.pdf

[13] McGuire, R., 2013. Building a sense of community in MOOCs. Retrieved from: http://campustechnology.com/Articles/2013/09/03/Building-a-Sense-of-Community-in-MOOCs.aspx

[14] MOOCs@Edinburgh Group, MOOCs @ Edinburgh 2013—Report #1, 2013. *Technical Report*, Retrieved from: http://hdl.handle.net/1842/6683.

[15] Moser-Mercer, B., MOOCs in fragile contexts, 2014. *Proceedings of the European MOOC Stakeholders Summit 2014, EMOOCs,* 114-121.

[16] Oliver, M., Hernández-Leo, D., Daza, V., Martín, C., and Albó, L., 2014. MOOCS en España: Panorama de los Cursos Masivos Abiertos en la Línea de las universidades españolas, Cátedra Telefónica – *UPF Social Innovation Education, Cuaderno de Cátedras Telefónica*. Note: In Spanish.

[17] Siemens, G., 2005. Connectivism: A learning theory for the digital age, *International Journal of Instructional Technology and Distance Learning*, 2, 1, 3–10.

[18] Unidad de Tecnología Educativa e Innovación Docente, 2014. "Types of Educational Videos". Retrieved from: http://portal.uc3m.es/portal/page/portal/biblioteca/UTEID/tipos_videos_docentes. Note: In spanish

[19] University of Toronto, 2013 "Massively Open Online Courses (MOOC) Design and Development Process Guidelines", Open UToronto, *Technical Report*. Retrieved from: http://www.ocw.utoronto.ca/wp-content/uploads/2013/05/MOOC-Design-and-Development-Guidelines-2-Feb-2013.pdf