Design and Development of MOOCs for the platform Federica: the experience of the University of Pavia

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Abstract. There has been a massive growth in online social networking in recent years. The increasing number of learners and Massive Open Online Courses [6], which were produced in 2012, is the most striking phenomenon. Since MOOCs are massive, a large number of different types of people can participate at the same time. They are open, so no specific requirements are needed to register and attend and the teaching materials provided have no copyright and can be freely shared. The novelty of MOOCs is that this kind of didactics provides an easy access to advancing technologies. Lectures are available online on virtual platforms on the network and not in physical classrooms. The motivations that have brought universities towards the implementation of MOOCs, are to be found in a growing awareness towards the need to reach an increasing number of users, entering models of lifelong learning activities and the opportunity to promote engagement in the knowledge society together with the increase of their institutional visibility.

Keywords: Didactics, Language, Location, MOOCs, Production process, Resources, Topic, Story-board, Video.

1   Agreement with Federica

The Conference of the Rectors of Italian Universities (CRUI) has recently published a document which invites all Italian universities to reflect on the MOOCs phenomenon and to join it. It has also been launched an initiative named "Progetto MOOC Italia", coordinated by the Chancellor of the University of Camerino, Professor Flavio Corradini. The University of Pavia has participated to this project chairing the group-work "Regolamento Osservatorio Nazionale" [3], confirming its interest in terms of MOOCs.

"Federica", born in 2007 as a project of the University of Naples Federico II, is the largest European platform operated by a public university. It is at the forefront of the international panorama concerning the innovation and dissemination of multimedia didactics and offers a wide range of courses (300 blended courses and over 100 MOOCs that encompass various disciplines within an open-access dimension (about 5 million accesses) [4]. Its educational offer is based on 4 pillars: the quality of the content and user interface, the openness and the web linking.

The creation of MOOCs to be presented on this platform, was intended to "increase the visibility of our institution", to maintain the identity brand, to develop technological

and educational potentials, "driving student recruitment" [1] and to create more flexible learning opportunities. Nowadays, it's important to "accept and address the idea that University, each university, is both here and elsewhere" (based on the American model), in order to face the process of dematerialization and delocalization and to stem the dropout rates that many universities are experiencing in recent times [4].

2 Resources

Drawing on the international literature [2, 8], a MOOC is a pedagogical tool that guarantees a structured learning path which includes: a syllabus and explicit teaching objectives, learning support materials and activities, usability through an online platform and scalability, so that it can be used by a high number of people. Producing a MOOC is a complex operation, which includes several phases (ideation, planning, realization, distribution). Each phase requires the use of human talents, as well as instrumental and strategic resources: every aspect must be highly professional if the aim is the production of a high-quality MOOC. Learning design for MOOCs follow particular approaches, given that the audience for which they are made.

2.1 Human resources

There are many professional skills involved in the production of a MOOC, which belong to different fields of activity. Recruitment, training and management of these professionals represent one of the most demanding challenges for the large-scale development of quality MOOCs. The most important figures are the Scientific manager of the project, the Course designer, the Movie director, the Video producer and the Video Editor.

2.2 Instrumental resources

Beyond the request for human resources it is very important to consider also the instrumental resources which are indispensable to realize high quality products. The ordinary IT equipment of most European universities appears sufficient to provide the basic infrastructures for the experimental realization and the diffusion of a MOOC. Anyway, the essential characteristics of a MOOC (global access and very high standards) require several technological investments that differ from the ones already available in most universities.

When a University intends to expand the scale of production and diversify the multimedia elements, the costs and the specialization of hardware equipment are also increasing. As previously specified, the 3 MOOCs were to be uploaded and used through the platform Federica. Regarding tools, we used high-tech, portable tripods, a flat interview microphone, a backup zoom microphone and reflective panels in order to eventually solve problem with natural lights coming from windows.

3   Production process

The production of good quality MOOCs requires a lot of work and expertise. The main purpose has been the attempt to make the learning space inspiring and stimulating, also because today's learners expect that their interests will be considered in the design process. "Mooc-takers' perspectives should always be taken into account" if the aim is to obtain student engagement and learning success [10]. In order to make the recordings, a preliminary design activity was necessary. Teachers have been progressively involved in the process of acquiring knowledge of the methodologies related to the design and implementation of a MOOC. Teachers, who voluntarily chose to join this initiative, were inserted in a specific work process defined "ad hoc" which is strongly different from the traditional way modules are delivered.

The preparation of a MOOC, unlike that of a traditional course, requires working with videographers, instructional designers, IT specialists, and platform specialists [9]. For each course were developed Design, Macro and Micro phases, carried out step by step in collaboration with the Teacher (convenor of the course), in order to define for each topic the structure of the module. The last step of this 'teacher training process' was dedicated to the verification phase and validation of the materials produced: after the post-production of the videos, teachers were asked to view all their video-lessons, identifying any problems, in order to rectify any errors, before loading the materials onto the MOOCs delivery platform and the start of the course.

3.1 Topic

It has been designed the realization of 3 MOOCs, two in Pharmacology and one in Physics.

The two Pharmacological MOOCs were meant to give greater visibility to the Department of Pharmacology and the world of drugs, including their research and development. For the realization of this MOOC the scientific director, vice-chancellor of the University of Pavia, Professor Stefano Govoni, succeeded in collaborating with leadings scholars belonging to various sectors, from psychiatry to cardiology and touched on various topics (Arrhythmia, Schizophrenia, sleep disorders, Alzheimer's disease, Parkinson's disease, etc.). At the end of the course, participants will be able to understand the complex biological interactions of drugs with human beings, appreciate the clinical use, and the possibility that the new molecules can respond to medical needs previously without solution.

The first MOOC contains a total of 12 lessons divided into 2/3 units each, accompanied by detailed Power Point presentations (5/6 pages maximum) and the second one contains a total of 10 lessons always divided into 2/3 units each and paper material supplied. At the end of almost all the lessons of both the MOOCs, have been

attached some lessons (units) entitled 'We put into practice' that contain videos shot by experts of the specific subject, to give a greater appeal and a wider contextualization.

The Physics MOOC was designed to highlight the excellences of the Physics Department of the University of Pavia, namely the study of innovative cancer therapies: Adrotherapy, BNCT (Boron Neutron Capture Therapy), applications such as Nuclear Magnetic Resonance Imaging (MRI), magneto-fluid hyperthermia (MFH) and the use of magnetic nanoparticles. The CNAO center (the first hospital and clinical research and radiobiology center in Italy, established by the Ministry of Health and one of the three Italian oncological Adrotherapy centers together with Catania and Trento) and the nuclear reactor L.E.N.A. (Applied Nuclear Energy Laboratory) were an important part of the project. The MOOC consists of 12 lessons with 2/3 units each. The lessons are grouped into 3 macro-areas of 4 lessons related to specific topics referring to the general theme. Six expert teachers from each sector participated in the project.

3.2 Language

The open access and global dimension of MOOCs has imposed high standards, radically changing the way of distance learning works, because it is increasingly perceived as an avant-garde teaching response to the training needs of digital generations [4]. As U. Corino and L. Napoletano point out [5], for an effective application of the "exhibition method" it is important to take care of two particular aspects: the "content" to be transmitted and the "language" with which it is transmitted. The content can be divided into simple pedagogical units, in turn ordered in a logical progression that facilitates learning. The cinematographic language should possess characteristics such as: clarity, simplicity and precision. In this way recipients of the messages will be able to decipher the expressions transmitted and receive the message from the trainer.

In all three MOOCs, teachers have organized the teaching so that it can be accessible to the widest possible audience. It is a matter of fact that the average user should have some previous knowledge of the topic he/she deals with, but all the experts have tried to use a simple terminology (easier to understand) and a technical but not too much cryptic language, in order to reach a wider audience.

3.3 Story-board

Before the recordings, a preliminary design and video design activity was required under the supervision of an audio/video production expert and the technological team. After an estimation of the location, a sort of story-board for each lesson was drawn, in order to define the narrative and introductory video-covers of the teacher, the shooting positions, the moments in which exemplary objects used by the teacher had to be introduced. Each video sequence was previously defined, in order to avoid any improvisation, which would have diminished the effectiveness of the shoots. Teachers

have been shot both frontally and laterally with different zoom percentages, to allow an alternation of their image switching between different angles of view, so as to avoid boredom in the MOOC takers.

4.4 Location/Set

One of the possible dangers of following the online lessons is the redundancy of the transmitted image, clearly different from a frontal lesson in a classroom with other students. Although it was possible to use a professional film studio equipped with green screen, which also allows to use the technique of Chroma key, it was preferred to shoot all the lessons in outdoor locations.

The shooting locations have been changed from time to time, to make them more associated with the context. In the case of the two MOOCs related to the study of drugs, many historical rooms dating back to 1700 of the University of Pavia (Scarpa, Volta, Foscolo, etc.), were used, which also allowed to show the historical and architectural heritage of our University. In the case of the MOOC carried out by the Physics Department, lessons were held in the CNAO center and the LENA reactor and in study laboratories. The machines were shown in various phases of their operation and experiments were carried out to give greater realism to the contents of the lessons.

4.5 Video

A very important point in the evaluation of a MOOC is the quality of the course videos. Videos have been shot in sequences of about 15 minutes. This may seem rather a short time but, as Philip Guo [7] has shown, the human level of attention paid when watching video decreases greatly beyond 9-12 minutes. Unlike the classroom, in which the teacher has the possibility of keeping students' attention and tiredness under control, a video lesson does not offer this possibility. Making short but rich educational content decreases the probability of "losing" the attention of the students along the way. It must also be underlined that by changing the type of teaching method, teachers had to gain confidence and learn to "relate" with a series of new tools like cameras, microphones and screens.

The production of all videos was divided into two stages: the recording of the professor's lecture and the editing. Teachers had the patience necessary to perform many 'shoots', because any hesitations or mistake or noise would have been disastrous for the quality of a recording. Every little detail has been verified, whether it was a cough, a bad light or simply the tie worn wrong. Some teachers decided to work with a tablet, others with papers on the table and others used no support speaking fluently about the subject. Teachers tried to behave spontaneously in front of the cameras, preventing the gaze from falling down on the slides on their PC or papers on the table. In addition, video editors chose the best sequences among those recorded, cut out moments of silence or stumbles.

It has taken up many hours to record one hour lecture, because of the need for repeated parts and inevitable pauses. The length of the process could be reduced, but to

detriment of the final quality, and it is well-known that the quality of videos is an important criterion used by the participants in a MOOC to judge it. It has also been shot a 'teaser' for each MOOC, a kind of short video lasting two or three minutes, where teachers appear, explaining the interest of the lectures that they are going to give and summarizing the essential points of the course.

4   Conclusions

The future of universities will be influenced by the ability to optimize the use of innovation and offer high quality products, encouraging innovation in teaching and learning. The main aim of the University of Pavia was to personalize, differentiate and define the workflow in the realization of a MOOC, adapting it to core objectives of its mission (Modernization and Internationalization of Higher Education System and the respect of the fundamental principles of the Digital Agenda 2020). As already focused in the description of the video-making process, this experience tried to give shine both to our University history and heritage and also to its most recent and brilliant advances in research and technology. This was how the team adapted a quite new way of sharing knowledge with a cultural experience of more than 600 years.

This collaboration with Federica allowed to the University of Pavia to develop a high quality online offer, meeting the ambition to propose university-wide, open and free courses to a potentially unlimited audience of students, giving also the opportunity to develop best practices in the production.

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