VIDEO-BASED EDUCATION: FORMATS AND KNOWLEDGE PROCESSES IN THE MOOC ERA

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Abstract

The MOOC landscape has seen over time the absolute dominance of the video format. Regardless of the reasons for this, it’s a fact that videos are the main medium in MOOC - although not new. When we talk about video format we should not make the mistake of thinking to a specific type of video. Indeed, this tool can be declined in very different ways. Simply, we could think about the possibility to have the teacher on the screen or not; to use the green screen technique or animations; to have a voiceover, to use the technique of storytelling or have pictures and words on the screen; and so on.

The choice of each of these options will affect the production in terms of cost and time: without forgetting, last but not least, the impact of the format on the effectiveness of learning.

Several studies move towards analysis of the MOOC aesthetic, trying to establish relationships and principles to finalize and optimize video design for learning.

Our experience as MOOC producers at Federica Web Learning has given us the possibility to enjoy and observe more kind of video through different subjects and platforms. Our work can be summarized as a comparative analysis of different video formats (video-lectures as also video-trailers), essentially carried out through our experience on the ground. At the end, we’ll try to make a map that could help teachers and institutions to choose the video formats most appropriate to the conditions and aims of each teaching situation online.

Keywords: video formats, video effectiveness.

1 INTRODUCTION

We all know very well how much our lives are currently experienced, conditioned and filtered by the screen. Much of the information we acquire passes through a screen, even though it means reading a newspaper through our smartphone. Within a circular process, technological evolution produces new artifacts that meet new needs and at the same time modify users needs and abilities. We could talk about it in terms of evolution: Darwin would say that evolving means adapting to change. Or we can think about McLuhan’s ideas of technologies as extensions of human faculties [1].

Accepting this premise leads us to two types of considerations: on the one hand on the change of processes and logic about organization and diffusion of knowledge; on the other hand on the use and potential of the image, especially the video.

The Internet dominance and the technology development led to new digital forms of expression which remediated [2] existing forms. There have been consequences in terms of access, quantity and organization of the knowledge. As well living in a world where writing prevails is not the same as living in a world where orality prevails, that is not the same as living in a world where the image predominates. Using different tools leads us to act differently, to think differently, to learn differently.

In conjunction with this transformation we can assume the progressive predominance of hypertext, defining it as a cognitive artefact which extends the human capabilities [3].

The other aspect of the issue is closely related to the visual construction of information. Actually “what we see is as important, if not more so than what we hear or read” [4], nearly 90% of information we receive comes from eyes [5] and close to 65% of us can be described as visual learners [6].

2 VIDEO IN LEARNING PROCESS

A fundamental contribution to the affirmation of video as teaching tools has come from MOOCs: since they appeared, as collections of different kinds of multimedia learning content put together by expert, educators and teachers, they have expressed the full potential of a hypertext.
As an expression of distance learning, videos in MOOCs have the purpose to improve interaction with learners: they can guarantee social presence and establish cognitive presence too through the ideas and information they impart. Video has proved to be one of the most effective media, mainly because of its visual and symbolic potential which had already been exploited in TV-based distance learning.

“Sound and video clips are frequently used in e-learning as a way to add richness to the learning experience, i.e. rather than just using text to encourage the motivation of the learner, and to provide an additional element of interaction between the tutor and the learner in a remote location. Video clips not only provide the semblance of some social contact for learners (contrast with textual emoticons) but also offer opportunities to demonstrate moving objects, such as engine parts, or chemistry experiments, in a controlled environment” [7].

Audio-video technologies offer better affordances than other media as they “convey visual and auditory information between arbitrary points, and thus afford remote collaboration” [8]. They do have certain limitations, however. Compared to face-to-face interaction, video reduces the width of the visual field being filmed. In real life we can take a free, three-dimensional view of what’s around us. Video limits us to watching the specific fragment of space that the camera is focused on at any given moment. The quality of the scene being filmed also depends on the quality of the technology. Our view of the “remote” scene is limited by the technology, not our eyesight.

Clark [9] said that it was teaching methodology that affected learning regardless of the medium chosen by the teacher. Practice, however, demonstrated that certain situations or concepts required a specific medium to convey the message effectively. If we imagine trying to describe a three-dimensional object using only audio, or describing a dance using only written text, we can see that these media are unable to describe the objects in question effectively. Various studies [10; 11] have highlighted how important video can be to the learning process but also shown some of video’s limitations where achieving learning outcomes are concerned. But it has proved difficult to identify those characteristics of video that would make it a more effective teaching tool. Griffiths and Graham [12], however, showed that the video component in asynchronous online courses had a positive impact on students’ learning experience.

Video is a specific media object that has its own communicative, symbolic and visual system.

In dual coding theory Paivio [13] suggests the existence of two distinct symbolic systems: one belongs to verbal information and the other to spatial and visual information. According to this theory, video may be a more powerful and effective medium for the delivery of education compared to only text or only images because it combines both a visual and verbal code. One of the major strengths of video is its potential for activating a specific response to the information conveyed so that viewers can store and re-elaborate the information, even at a later date. Obviously, the way the message is perceived depends on the interaction between content and the style of presentation rather than on what medium is used [14].

Using video for learning relies on integrating previous knowledge with the new information the teacher wants to present. Inspiring interest is one of the major aims in teaching because teachers know that the more students love their subject the more they will want to study it. It is undeniable that video is a medium that makes learning more appealing as long as it is used correctly. If video is to capture students’ attention, the words and images need to be carefully intertwined so that their combined effect is greater than the sum of their parts. The teacher’s presence - much like listening to their voice on audio, only more so – reduces the gap between a teacher-led classroom lesson and an online lesson. The addition of audiovisual signals, in fact, makes the user react more favorably and naturally to the learning content than when they simply have to read information like in a book or traditional web page.

Sherry [15] notes that the information processing approach subscribes to the theory that:

- The teacher represents an abstract idea as a concrete image and then presents the image to the learner via a medium.
- The learner, in turn, perceives, decodes, and stores it...
- The learner then develops his own image and uses it to construct new knowledge, in context, based on his own prior knowledge and abilities.

Video, therefore, can be considered a useful means of capturing the wealth and complexity of classroom practice and transferring it to other environments [16; 17].
Kaltura [18] forecasts that video’s role in education will grow, until to become a standard. It will be used as communication instrument for feedback, assignments and portfolios and as tool for flipped classroom. The shared expectation is that videos could progressively replace textbooks [19; 20].

Certainly, video is the most widely-used medium within MOOCs, to the extent that it is considered central to the learning process on this kind of course. Video, however, is a very general term so we need to identify its specific characteristics. The typical academic video format focuses on a teacher in a lecture theatre, behind the front desk, writing on a blackboard while they deliver their lesson. With MOOCs, the setting is neutralised and the background and camera angles change.

Since teachers are often responsible for making their own videos, the quality is not always high. An analysis of Coursera courses, for example, reveals more video lectures than interactive videos, videos where the teacher is relegated to a corner of the screen, or low-resolution films. The graphic formats are not always properly balanced, creating cognitive dissonance for the user and in, some cases, there is an erroneous use of images when concepts, techniques or procedures need to be explained.

Other videos are more similar to hybrid models, with an interview-howto format with the teacher talking directly to camera and to the viewer and, to any other people sitting with them. The “language” also changes (or rather, a new type of language is being used for the first time) whereby the video-camera is not fixed but follows the actions of the teacher, using the camera focus and angle to help direct the student’s attention.

3 TYPES OF VIDEOS

One other variable that should be taken into consideration is the actual type of video that is used, the format as well as the quality: for example, black and white or color formats, composite pictures, animated diagrams, modeling, illustration, demonstration, presence of human, animal, particular environment etc. Arbaugh and Hwang [21] also investigated the results of mini-lesson videos.

It is important to remember that the function and design of any particular piece of technology is not the only factor that defines its educational usefulness. Another important consideration is how imaginatively and creatively students use the technology to achieve their learning aims.

Any analysis of the affordances of video content requires us to provide the answers to a set of questions relating to the objectives of video itself. For example: Does this topic need a video explanation (or is a simple written or audio text enough)? Is the presence of a person (the teacher) to act as guide necessary? Is animation necessary? Does the setting need to be internal (e.g. a classroom) or external?

These are only some of the questions that need to be asked before producing any learning content and they form the basis of any decision regarding which channel, or medium, is best.

Since the number of questions may be infinite and since video is intrinsically adaptable and can be used to fulfill a majority of teaching aims, the risk is that additional teaching objectives are specially created to justify the use of video. This practice, which can be defined as inventing media-suitable objectives is fairly common [22]. An analysis of educational videos present on the Web enables us to identify certain categories of film. The most commonly used formats (not only by Academies but also by individuals wishing to share teaching videos online) fall into five main categories:

1. Infoanimation (usually computer graphics);
2. Videolessons;
3. Interviews;
4. How To;
5. VideoSlide.

Clive Young [23] classified video applications depending on levels of student participation or interactivity. At the lowest levels, teachers simply address the camera from a classroom or studio background and explain lesson content to their viewers,
When a teacher decides to take an active role in the video, much depends on his or her ability to become a **performer**, that is, to know how to grab students’ attention and keep them interested. As Gladwell [24] showed, students judge the quality of the teacher within the first few minutes of a video.

Animated screenshots have been used for years but it wasn’t until the advent of broadband that they were quick enough to be effective. They are usually made on screen capture programs (like Camtasia) which enable teachers to use what students did on-screen in an edited montage with background music and audio commentary. Another popular format is the so-called “How To”, *step by step instructional videos* that show viewers how to achieve a particular goal. This type of video has been around for a long time but digital technology has led to non-linear narratives whereby the viewer can choose which stage of the procedure to start from depending on their learning needs.

YouTube has done a lot to promote the kind of selfies videos where people introduce themselves or show off one of their skills. They allow for self-promotion and are appealing to viewers as they can comment on them too. The next step, which allows greater interaction and participation on the part of the student, is that of making their own videos.

Interviews are another popular format, partly because they are easy to make.

Another interesting classification regarding the video formats it’s proposed by Laaser and Toloza [25] and originates from Hansch et al. [19] the video design patterns we found are defined in figure 1.

![Figure 1 Video design patterns. Source: [26].](image)

It is worth to give a specific reflection on the importance of the teachers and their training in the choice to use video, and which kind of video. In their research Christ & Poonam & Chiu [26] found that teachers educators tend not to use full range of video methods. Differences among use of the video are not closely related to disciplines but are linked to teachers’ beliefs [27; 28; 29]. Self-reflections, peer discussions, professor-led discussions, and multimedia were all used with low frequency: the consequence is not to use the full potential of the tool, without reaching the best outcomes [30; 31]. The point is that teachers’ assumptions about teaching come directly from their learning experiences [31]: for this reason becomes fundamental to help them to discover the full video potential. Thus they could be capable to help students:
to use reflective thinking of what they are seeing and hearing. The use of videos – in whichever way it is implemented – can help promote a student-centred environment where the pupils are learning by doing; as well as promoting a more critical awareness of their consumption of media products [32]

Indeed video can be a tool also for student: “learning by doing”, demonstrates how levels of understanding of a particular topic are proportional to the commitment and energy that a student devotes to putting the learning into practice. Creating a video can be a collective process involving groups of students, in which case the creative process enables them to become co-authors of knowledge.

It is clear that producing a video is more effective than watching one, but, as Young points out, educational contexts are so varied and complex that we always need to select the most appropriate method for each specific topic or subject. The length of any video clip is another important consideration because it should never last longer than three minutes and it is important to remember that the audience is made up of people with different tastes and attitudes, not only students. The format needs to be relevant to the teaching aims.

There has been a significant increase in the amount of video production over the last few years, mainly because audiences like it and find it appealing. After the success of projects like the Khan Academy or Ted talks and, of course, YouTube, educationalists and education institutions have to experiment with new e-learning platforms and formats based on open access and large numbers of users: MOOCs.

4 FEDERICA WEBLEARNING EXPERIENCE

“Federica” is the WebLearning portal of the University of Naples Federico II. It was established in 2007 with European Structural Funds with the aim of developing an immaterial infrastructure and providing free access to knowledge, a sound structure and an innovative approach to online learning. Over the last ten years, Federica has produced more than 300 course and 5,000 lessons which have been transmitted through its portal www.federica.unina.it. When MOOCs appeared, the same team started to work on www.federica.eu, producing and studying MOOCs. Actually, the threshold of 80 MOOCs it is been exceeded.

Federica appears different from those of other MOOCs for some specifics reasons. Years before the emergence of the ‘massive course’ phenomenon, the platform Federica.unina.it had created its own model of WebLearning, centered on Web resources (hence the prefix ‘web’ substituting the traditional ‘e’), with the purpose of achieve an hypertextual learning. Federica’s main distinctive trait, besides its contents, is a multimedial, horizontal navigation. Contents can be accessed as ‘slides’ and users can browse them by ‘context’. Each slide features images, videos, or audio tracks, as well as links to further resources on the web. E-learning platforms designed in the 2000s and, more recently, MOOCs, both use multimedia resources as ‘monads’, single elements that are not necessarily connected to each other. It is up to the user to construct the overall meaning of these resources and their potential interconnections. At the same time, Federica’s multimediatc contextualization provides users with a selection of learning ‘pathways’ which can help them through their learning experience.

Approaching the MOOCs, Federica entered in video productions field. The workflow starts with a meeting with the teacher; on this occasion is fundamental to deeply understand teacher needs, regarding the subject and the way in which the course is structured. This is a very important step: here is established video format and everything related to the shooting. It is clear that different subject need different approaches.

We made a selection of 5 of our courses that can be explanatory of our methodology (figure 2):
1. Motion and Strength - Prof. D. Nurzynska

2. Physics of Galaxies - Prof. M. Capaccioli

3. Contemporary Issues in World Politics - Prof. I. Turan and Prof. M. Tuğtan

4. Introduction to Philosophy - Prof. M. Ferraris

5. Global Politics - Prof. Y. Schmeil

Figure 2 – Some example of Videolectures format on Federica.eu
You can notice - and it’s forthwith clear for the scientific MOOCs 1 and 2 in the figure above - the intention to build a set as much immersive and representative as possible. For the example 1 we set the shooting in an anatomy museum and in a laboratory: there the teacher can interact with and show practically objects to the learners. To complete the students experience and clarify the topics we have added animated texts overlay and images. For the example 2 we shot the videos in two different ways: a part in context-related environments, while the other part with the “green screen” (chroma) technic, reconstructing then around the teacher the desired space for an experience as immersive as possible. The third MOOC could be a classical talking head model, but we have put the teacher not only into a familiar environment, but also “in the field”, trying to make the lesson more dynamic.

For course 4 - a course about history of philosophy - we evenly tried to put the teacher directly inside the things he was telling. Then a part of the lessons is talking head - but with a background appropriate - the others are animations, on which the teacher’s story continues.

The course 5, it’s a truly example of storytelling. The characteristics of the subject and the teacher’s approach together have been able to illustrate the concepts of the field exploit the characteristics of space, the city of Naples, and the peculiar elements of the environment.

Though the subjects are different, as the difficulties and the solutions, what remains the same is the knowhow, built through 10 years of weblearning experience and the will to maintain a quality standard.

For these reason, we pay close attention to field developments and are deeply interested in pursuing research to optimize video as an educational tool.

5 VIDEO EFFECTIVENESS

Currently there are no systematic studies about video effectiveness in MOOCs. The issue is rather complex: starting from the amount of variables to consider, passing through how to distinguish them, to the way the same variables can be measured. These are the big issues of learning analytics. Likewise there is not yet a study that explores all the possibilities of video, clarifying which format is more effective.

In 2006 Zhang et al. realized a study entitled “Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness”. Although it was carried out some years before the MOOCs explosion, it remains very interesting for the comparison of four different settings: three were e-learning environments - with interactive video, with non-interactive video, and without video - and a traditional classroom; they measured learning outcomes and levels of learning satisfaction. The study demonstrated that “incorporating video into e-learning environments may not always sufficient to improve learning. Interactive video that provides individual control over random access to content may lead to better learning outcomes and higher learner satisfaction” [33].

Thus the presence of video is not enough to improve learning, it depends on the kind of video. Other considerations were made specifically on the aspect that they should have; we refer to the aesthetics of the videos [34]. Aesthetics can be considered as a key element to active participation and engagement with environment or object [35]. The reason of this is explained by O’Toole [36], when he talks of painting functions: “the modal function (to engage our attention and interest), the representational function (to convey some information about reality) and the compositional function (to structure these into a coherent textual form).”

This means that integration of learning with aesthetic elements helps to realize an engaging experience, promoting curiosity, exploration, investigation, creativity, and meaning [37], because of the combination of senses, intuitions, past experiences and intellect of the user/learner [38]. Therefore it’s fundamental, during the learning design phase, apply strategies to involve the learner, attracting his attention, inspiring his emotions, thoughts and memories, as a resource for learning.

Some valuable advices come from work of Hansch et al. [39], and they summarized the conclusions in this figure:
We can conclude with some considerations (reworked from Laaser and Toloza [25]):

- Shorter videos are more engaging than longer videos.
- Videos that intersperse an instructor’s talking head with slides are better than using slides alone.
- Videos with a personal touch can be more engaging than high-quality studio recordings.
- Khan (Academy) style tablet drawing tutorials are more engaging than PowerPoint slides or code screencasts.
- Videos, which show instructors speaking quite quickly and with enthusiasm, are more engaging.
- Videos you interact with are more effective.
- Aesthetic it’s a powerful approach.

Choose the type of video thinking about the subject and teacher features increases its effectiveness.

### 6 CONCLUSIONS

Compared with older videos from telematic universities and early e-learning experiences, two major changes can be seen:

1. The traditional classroom setting has been abandoned along with the teacher’s desk, and teacher writing on the blackboard with their backs to us. It has been replaced by a white board that occupies the whole screen, and here the teacher writes and comments off-screen (only the teacher’s hand is visible). Camera angles are no longer fixed at long range but change according to where the focus should be with medium range shots and close-ups. The viewer is almost “immersed” in the scene, or, put another way, the scene takes over the spectator’s visual field.
2 The lesson and course do not follow anything like a syllabus but create a kind of “narrative” that involves students in the learning process.

The importance of narrative had already emerged with the TED talks, with well-known experts taking to the stage and performing their favorite subject. Theatrical camera angles combined with excellent narrative and presentation skills and some occasional multimedia support enable the speaker to teach the audience about a specific topic within 5 to 10 minutes. It is the narrative skills that grab the viewers’ attention and help them remember the content of the talk better.

The MIT Professor Walter Lewin’s physics lessons proved very popular. He was filmed inside a lecture hall but took part in the experiments himself and managed to get the students involved too, making for interesting viewing. It is not only the video format that is important, therefore, but also the kind of language it uses. In this case, we see elements of television and cinema language: the ability to command the stage, to get the viewers’ attention and to interact with the environment and the spectators. Lessons, in some cases, have the structure and language of theatre, reminding us of television’s power to massage (McLuhan) the viewer. These are elements that can also be found in scientific TV-show.

One other important element is the way the video-lessons are divided into units so that they can be viewed in any order, even randomly. Progress tests are also included and the graphics on the tests are the same as those of the videos. This reinforces the impression that they belong together. The same is true of the white background that most MOOC platforms and videos choose to use and suggests that we should investigate their role and affordances in the learning process.

Current MOOCs courses seem to exploit the most popular types of web-based communication and involvement. MOOCs themselves should not be seen as a new format but rather as aggregators of tried and tested formats. The idea of student involvement, the construction of a narrative and the teacher as performer are all indications that MOOCs needed to use the best available formats in order to stand out in the crowd of videos present on the web. The lecture format has been around for years as a way of creating a digital version of the analogue format of classroom teaching and critical issues relating to this format are familiar. MOOCs preferred to invest in short films that interest and involve the viewer like television, making them forget they are following a lesson.

This new type of video, the type found in MOOCs too, seem able to overcome the basic barriers to distance learning because they re-establish a social presence. Thanks to their audiovisual approach the medium becomes transparent to the student-viewer and manages to focus his/her attention on what is being recounted in the film rather than on the medium itself.

This seems to be a big opportunity, but it could bring some risks. We are moving from a pure educational approach to a kind of infotainment approach. If, on the one hand, it meets the needs of an audience of learners and seems optimize the learning experience, such an evolution will surely increase producing time and costs. Furthermore, it is not possible to ignore the transformation of the role of the teacher. How will we define a good teacher? From the quality of his performance in front of the camera? Will the teachers continue to appear in videos, or will they be replaced by professional actors?

Careful observation of these processes should continue. As so-called “screen culture” evolves over the next few years, new learning spaces will develop that are no longer limited by the TV, computer, tablet or smartphone screen but are integrated in wearable devices – like Google Glasses – and can interact with real objects through augmented reality. Immersive environments and transparent media will ensure even greater student interaction and involvement in the learning process.

REFERENCES


