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# Pedagogical models for video communication in massive open on-line courses (MOOCs): a success story

## Abstract:

The initiatives on MOOCs promoted in the United States by prestigious universities, such as Stanford, Harvard, MIT, and by private bodies such as Udacity, aroused great interest worldwide; however the teaching and learning models proposed with MOOCs do not appear to rely on solid theoretical bases and, therefore, on valuable psycho-pedagogical models. The aim of this paper is to analyze some pedagogical aspects related to video communication models in order to highlight the strong and weak points of the educational framework of these initiatives. The teaching models adopted by the International Telematic University UNINETTUNO for its video lessons, the distance assessment systems, the teacher/tutor and student distance interaction models reached such a quality level that it allows us to generalize this model and trigger teaching and learning processes of high quality and to lower the dropouts rates of the students enrolled in MOOCs.

## Summary

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# Modelos pedagógicos para video-conferencias en cursos on-line masivos en abierto (MOOC): una historia con éxito

### Extracto:

Las iniciativas en MOOC promovidas en EE. UU. por universidades prestigiosas, como Stanford, Harvard, MIT, y por organismos privados como Udacity, despiertan un gran interés en todo el mundo; sin embargo, los modelos de enseñanza y aprendizaje que se proponen en los MOOC no parecen contar con bases teóricas solidas y, por lo tanto, con modelos psicopedagógicos válidos. El objetivo de este artículo es analizar de forma pedagógica aspectos relacionados con los modelos de comunicación mediante vídeo con el fin de resaltar los puntos fuertes y las debilidades del marco educativo de estas iniciativas. Los modelos de enseñanza adoptados por la International Telematic University UNINETTUNO para sus formaciones en vídeo, los sistemas de evaluación a distancia, los modelos de interacción *on-line* profesor/tutor y estudiante alcanzaron tal nivel de calidad que nos permite generalizar este modelo y desencadenar procesos de enseñanza y aprendizaje de gran calidad, así como reducir las tasas de abandono de los estudiantes matriculados en los MOOC.

**Palabras claves:** diseño de videoconferencias, aprendizaje *on-line*, MOOC.

## 1. KNOWLEDGE ALLIANCES AND MOOCs

Presently there are very interesting facts going on worldwide; in some prestigious American universities a new idea of global education is starting from the bottom. Many universities are tearing down their ivory towers and are using the most powerful platform in the history, the Web, to make their contents available to the widest possible public. Lately, in the main American universities and, recently also of Europe, some initiatives, such as the «Knowledge Alliances» and the MOOCs (Massive Open On-line Courses), that offer on-line university courses including free-access video lessons, texts and practice work, are made available. In the past three years, Stanford, Harvard and MIT, have together pledged tens of millions of dollars to MOOCs development. Many other élite institutions, from U.C. Berkeley to Princeton, have similarly climbed aboard. Their stated goal is democratizing knowledge. Some universities of the US system, such as the California State University system, moved to incorporate MOOCs into their curricula: in addition to having their own professors delivering their courses, they may use video lessons by tenured teachers of universities such as MIT, Harvard or Stanford. The other side of the coin, in terms of enrolled users and impact on the media that these initiatives are having at global level, is that there are some critical aspects that emerge if we analyze their characterizing educational and organization models: the lack of a psycho-pedagogic model in the video lessons and course design, the unreliability of the assessment models applied to skill-level upon entry, to the assessment of mid-term learning performances and to the pattern of the final exams that should certify the acquired competences, the ever higher dropout rates found in course attendance, in spite of the number of enrolled students who are attracted by the fact that they are free.

## 2. MOOCs IN THE UNITED STATES

In the United States the main university-level MOOCs are Coursera, edX and Udacity. Coursera, a Stanford spinoff, defines itself as a «social entrepreneurship» company operating in partnership with traditional universities to offer «open» distance university education. With a 30 million dollars investments, Harvard and MIT jointly with edX, established a non-profit company aimed at realizing and delivering MOOCs cooperating with colleges and universities, including U.C. Berkeley and Rice, etc. edX is structured as a federation in which each member owns its MOOCs production. Udacity, instead, presents itself as a for-profit com-

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pany. Established by Sebastian Thrun, former professor at Stanford, Udacity too states that its mission is to offer university education to the widest possible public. Udacity keeps on producing its courses on its own, but it started up a set of partnership agreements with traditional universities that allow attending Udacity courses and taking the exams on campus, such as at Georgia Tech, San Jose University, etc.

## 3. MOOCs IN EUROPE

In Europe too, where university institutions have being working on the issue of OERs (Open Educational Resources) since a long time, appeared some MOOCs initiatives involving universities and, in some cases, even some companies. The OpenupEd Portal [www.openuped.eu, realized by the EADTU (European Association of Distance teaching Universities) and by its partners] adopts a very interesting approach allowing valorizing diversity in the methodological-educational approaches of the universities providing their own MOOCs. On OpenupEd each European university presents its own MOOCs model and does not follow pre-established formats. E-Learning platforms where distance teaching and learning processes are carried on, are managed by the single universities and do not have «standardized» functionalities; courses are built and delivered according to the specificities of the educational models of the single universities. All partners signed and shared a paper on quality and are jointly realizing the first handbook on quality that is specific for MOOCs. Since 2013, beside the case of OpenupEd, several European-level initiatives were launched, clearly modeled on the US model. Two models are presented here below:

- **Miríada X** is promoted by Telefónica Learning Services and Universia, the main network of Spanish and Portuguese languages universities. Its stated aim is to provide 1,262 Ibero-American universities of a space for sharing and publishing free courses to reach the huge population of Spanish and Portuguese-speaking students.

- **FutureLearn** is a private company wholly owned by the Open University. Its partners include UK and international universities, as well as institutions with a huge archive of cultural and educational materials, including the British Council, the British Library, and the British Museum.

## 4. PSYCHOPEDAGOGIC MODELS FOR MOOCs

From a pedagogical perspective, the general model is similar for all US initiatives. Each course is structured upon several Didactic Units that, in turn, include:

- **Video lessons**, structured on sequences typically lasting from 5 to 15 minutes; the sequences are separated from the other didactic sections mainly be finger exercises.

- **Finger exercises**, that is small tests, based on multiple-choice or on a semi-structured pattern, used to separate the sequences and fix into memory the concept learnt and/or put into practice the theoretical notions previously illustrated.

- **Problem set/Homework.** «Homework», concluding each didactic unit, include a set of problems/questions of higher complexity than finger exercises.

- **Q&A/Forum and Wiki.** Asynchronic systems of exchange, discussion, collaborative construction; in few cases monitored by a teacher or tutor, but usually managed by the students on their own.

The model of courses offered by the three MOOCs, Coursera, Udacity and edX, stands out for some particular features; nevertheless, all three models have evident methodological shortcomings linked, in particular, to the video lessons communication model. The video lessons are not based on a set format and their structure does not allow to imply that, at the basis of the video communication of video lesson, there is a definite educational model and robust theoretical bases supporting the communication model as well as teaching through the use of a particular language, namely the language of images, that has its own rules and theories.

The video lectures of the three US MOOCs appear differently: some video lectures directly reproduce the lectures as they are delivered by the professors in traditional lecture halls. In others what we see is mainly the teacher's handwriting on an electronic board while he explains what he is writing. Others are realized by adopting an «informal» shooting technique of the video teachers without any particular attention to a setting or to a communication model.

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# 5. THEORETICAL MODELS FOR REALIZING VIDEO LESSONS, A CONCRETE EXAMPLE: THE VIDEO LESSONS OF THE NET-TUNO MODEL

Many are the doubts aroused by the MOOCs pedagogic and organizational components. In spite of the pedagogical justifications of the course delivery model used, to which, for instance, Coursera devotes a special page, the teachers who deliver their video lessons do not appear to rely on solid theoretical bases when communicating their knowledge. There are well-consolidated theoretical models on how to prepare a video lesson in such a way as to assure its educational efficacy: shooting a lecture in a traditional classroom is not enough; instead, you have to be aware of the fact that you use visual language to communicate knowledge and that it has strictly established communication rules. The realization of a video lesson requires a special preparation and, in order to exploit at best the potentials of the medium, the teacher has to work jointly with a team of technicians and experts in the visual language; all this requires hours and hours of preparatory work.

At present, thanks to continued research activities, analyses and experimentations carried out also at UNINETTUNO University, in which 10,000 students were involved and who received questionnaires, whose questions were aimed at checking the way the video lessons were exploited in order to develop learning processes. The outcomes of the analysis of these questionnaires allowed to devise the current communication model being adopted by all UNINETTUNO lecturers when they realized their video lessons and related educational materials. The teachers who deliver their courses using the video lessons were trained in using a new way of explaining, summarizing and presenting their knowledge to a virtual student in order to succeed in triggering a critical and reflexive learning process. The video lessons require a great deal of work on the teacher's part if he wants to exploit all the potentials of this tool. This naturally develops in the teachers new communication skills and the use of new languages.

Actually, the teachers had to learn how to communicate on video, but they had to learn also how to design and realize multimedia products and virtual laboratories linked to the video lessons; they had to learn how to teach using videoconferencing systems, to guide the students along their self-learning process using non-traditional tools, methods and technologies. The Internet-based digitized video lessons developed a new way of teaching and learning that radically modifies the traditional university teaching model in which teachers and learners are present in the same place. With the Web-based video lessons teachers and learners are not present in the same place and the kind of communication that takes place is one-way. This characteristic allows us to liken it to another form of one-way communication, that is, the production of a written text (Horowitz and Samuel, 1987). In designing the video lessons we took into account some of the existing theories about one-way communication and in particular:

- With regard to the aspects concerning reasoning and information representation. The reference is to the theory of mental models (Johnson-Laird, 1983).

- On the role of memory, the functioning of the mind and the understanding of learning, cognitive and association theories were adopted (Bower and Cirillo, 1985; Norman, 1988; Gagné and Briggs, 1974; Ausubel, 1978; Vygotskij, 1978).

- With regard to written communication and on the characteristics of the technological medium to enrich the communication with different registers (Horowitz and Samuels, 1987; Garito, 1997).

The video lessons appear as a guided didactic conversation; the specificity of the communication medium makes the teacher, beside transmitting knowledge on a given subject, guide the student towards a learning-effective method of study, and encourage a critical reading of the exam textbooks. The teacher delivering the video lessons speaks to the student, suggests him to take notes, creates connections with other issues and themes, recalls links with texts and more-in-depth study lecture notes, proposes exercises and encourages self-assessment asking questions and raising problems, he invites the students to get in touch with tutors in the interactive environments of the Internet-based Didactic Cyberspace to start up practical-collaborative learning processes.

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# 6. LEARNING TRIGGERING

The above-mentioned theories related to communication, learning and memory established the scientific basis on which the educational model used to realize a video lesson was built. More specifically, we adopted the cognitive and connectionist theories describing mental activity as composed of the succession of three different phases: the acknowledgement of information, its transformation and processing and at last its storage into long-term memory.

In the realization of a video lesson the teaching process is divided into different phases:

- **Motivation Phase.** In this phase, it is important that the teacher introduces an adequate external stimulus to keep the attention alive and increase the students' motivation. To this end one of the possible techniques to be adopted is that of communicating the course objectives or show the prerequisites needed to follow the course. In this way the student establishes significant links with his previous knowledge and finds the bases to which integrate the new notions.

- **Comprehension Phase.** In this phase the teacher tries to stimulate a selective and discriminating attention as it regards previous knowledge, guiding them to focus attention only on those elements that are necessary to develop new knowledge.

- **Acquisition and Retention Phase.** In his phase, the student codifies the information he receives and transforms and stores it in his memory. To facilitate this process, it is important that the teacher guides the learning process of the student in order to suggest a useful method of codification suitable for the contents and training materials that the student is learning.

- **Recall Phase.** This phase is related to the retrieval of stored information. To facilitate this process, the teacher should not only stimulate the retrieval of information but also offer suggestions on strategies to be used by the students to retrieve past notions.

- **Generalization Phase.** Generalization is obtained when information is transferred to various contexts. In this phase the teacher proposes different contexts in which the retrieval of this information is necessary for the solution of a problem.

- **Performance Phase.** This phase is related to the use of the learning that has taken place or the skill that has been acquired, namely the task that had been stated as the learning objective. To do so the video lecturer has to supply examples as well as the means of evaluating it (that is to say, the means of verifying the correctness of the performance) in such a way that the student, even on his own, will be able to check his own skills in problem-solving assignments.

- **Feedback Phase.** For the student, having detailed independent feedback on his performance that will help in verifying whether he/she succeeded or in comparing his/her performance to a standard model is a very important way of motivating learning. In fact, feedback acts as a positive reinforcement to further learning if the performance is correct and if the response is incorrect it gives a clear indication of the specific points that the student must give more attention to. Feedback is given also through the direct interaction among teachers and students in video-chats and Web-based virtual classrooms (Garito, 1996).

Some techniques aimed at triggering learning processes are described below:

- **The first technique is the presentation of questions and queries.**

  Questions make direct reference to knowledge, ability related to the object of learning and can be addressed to the student at different times: they have different functions depending on the type of question and the place they occupy. With regard to the position of the question in the lesson, the function of the introductory questions to content consists in eliciting information from the student concerning his knowledge of the subject. The questions asked the student throughout the lesson are intended to stimulate the student to reflect carefully on the treated subjects and make him carefully process this information. Finally, questions to be asked at the end of the lesson allowing the student to review the path made and check his own learning are included at the end of the lesson.

- **The second technique is the communication of the teaching objectives.**

  It consists in a clear illustration of the educational objectives that are explained not in abstract terms. The

> **In the realization of a video lesson the teaching process is divided into different phases:**
>
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clarification of these objectives allows the student to channel his efforts towards a specific task and gives him the opportunity to check his actual progress towards the achievement of the envisaged skills.

- **The third technique consists in presenting general overviews.**

  These could be summaries, written explanations with drawings or diagrams that allow the student to focus his attention on the essential elements. The functions of this technique consist in the preparing the students' cognitive matrix for this learning process and in giving a general reference frame within which to put the contents to be learnt.

- **The fourth technique is the utilization of the organizational prerequisites or propaedeutic concepts (Ausubel, 1978).**

  This technique consists in presenting introductory material at a level of abstraction, generalization and comprehensibility that is higher than that of the content to be studied later on. We must recall the conceptual frames that allow for grounding the learning material to the student's cognitive structure, supplying, so doing, a coherent conceptual frame.

  The relationship among oral, written and graphical language plays an essential role in the video lessons, which, consequently should be structured in such a way as to guarantee a perfect synchrony and correspondence between writing and speaking since the simultaneous activation of the audio and visual channels enhances the student's attention. On the contrary, when the video displays writings that do not correspond to what is said by the professor, the information turns out to be incoherent and hinders the cognitive process.

# 7. USING SLIDES IN THE VIDEO LESSONS

A useful communication tool that is at the teacher's disposal during video lessons is represented by the slides which summarize the concepts illustrated in the video lesson using concise texts and keywords, pictures, animation, tables, charts etc.

Slides can be defined, according to Norman's wording, as «cognitive artifacts», that is tools created by man to expand his mnemonic and cognitive possibilities. They are external supports that make us smarter because they strengthen our mental possibilities. An appropriate use of a graphical presentation makes the student's cognitive processes easier. Nevertheless, it is also possible to make an inappropriate use of the graphical material: often, actually, slides include the presentation and reading of long and complicated texts and/or key words that are unclear and not concise and of no use to summarize and pinpoint basic concepts and that is the reason why it becomes difficult to access information and process it further. Therefore, while designing and realizing a slide, it is necessary to find the representation that best suits each task, that is to say using an appropriate format of each message to be sent helps the student accessing information and makes its further processing easier. In this regard, it could be useful to remind also that there is no single correct way of presenting information, since the «appropriateness» of the representation depends on the message and on the aim that you set. Therefore, to make graphical tools work as cognitive artifacts, able to extend and implement cognitive skills, it must be taken into account the fact that their power derives from that of representation: therefore, in order to understand cognitive artifacts, above all the concept of representation must be understood. To be correct, a representational system has to: catch the critical aspects of the represented world and, on the contrary, ignore the irrelevant ones; they have to meet the expectations of those who use them enhancing their interpretation processes; they have to be suite to their task. Therefore, the selection of the correct representation changes the task difficulty level; besides, already Piaget demonstrated very unambiguously that the different representation of information fairly changes the final structuring of knowledge and the solution of the problems (Norman, 1993).

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UNINETTUNO psycho-pedagogic model was developed to include all the phases comprised in a multimedia, hypertextual, integrated and open learning process which is carried out in a specific area of the Didactic Cyberspace of the portal on: www.uninettunouniversity.net. In the Cyberspace all video lessons are digitized and indexed by subject and each subject of each single lesson is linked to texts, books, lecture notes, exercises, virtual laboratories, discussion forums structures by subject, moderated by teachers/tutors, to video-chats and Web-based interactive Virtual Classrooms. Students can easily: access networked collaborative and cooperative learning environments; start up a Socratic dialogue with the teacher that supports and guides the training process; interact with the other actors in the educational process, that come from other cultural and linguistic contexts, with a view to learning in a global and not local perspective, fully investigating the subject in websites that have been selected by the teacher, becoming active constructors of new knowledge. Through the use of digitized video lessons, the student can start up symbolic-reconstructive as well as hypertextual and multimedia learning processes. They can enrich and improve metacognitive strategies and promote active, customize their learning paths and start up active, constructive and interactive learning processes. This model, therefore, develops three types of learning: the symbolic-reconstructive based on video lessons and texts, the learning-by-doing one thanks to the use virtual laboratories and practice work and collaborative one thanks to the use of bi-directional interactive technologies.

In the Didactic Cyberspace of the portal on www.uninettunouniversity.net there are over 50 thousand hours of digitized and usable video lessons on all the disciplines related to scientific and humanistic disciplines and a good amount of those of the engineering sector are realized by lecturers of several universities of the world as well as of the Arab World.



# 8. ARE MOOCs GOING THROUGH A CRISIS?

Nobody can question the significant role played by MOOCs in opening the lecture halls of the most prestigious American universities to the world. Everybody can have free access to contents posted on the Web from anywhere in the world and from any social background. However, today this is not enough. We must engage in identifying the scientific models on which the realization of MOOCs should be based in order to make pedagogical effectiveness reduce the very high dropout rates that, in some cases, amount to over 90 %. The enthusiasm that, at the beginning, surrounded the MOOCs phenomenon has been weakening; the slogans for which MOOCs would force traditional universities to shut up shop one after the other have been changing. The first criticisms, usually made by representatives of traditional universities, were about the courses dropout rates if compared to the number of enrolled students[2]. Therefore, the first criticisms were made on their low effectiveness level, difficulties and value in educational terms of the assessment tests associated to the different courses[3], often structured as simple multiple-choice questions, these criticisms suggested to search for and implement new on-line learning assessment modes that could be actually effective to measure learning performance as well as to help students put into practice the theoretical knowledge they learnt. This is why the first collaborations between MOOCs initiatives and traditional universities were unsuccessful: the experiment carried on by Udacity and San Jose State University was officially put into «pause» when they saw that the skills developed by MOOCs students (by the way, a project developed in cooperation with the teachers of San Jose) were remarkably lower against those of the students who had attended the same course on the face-to-face traditional mode[4]. Today, there is much more awareness about the problems implied in these initiatives even among their promoters if it is true that John L. Hennessy, the president of Stanford and, consequently,

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[2] http://www.huffingtonpost.com/jonathan-haber/mooc-attrition-rates-runn_b_4325299.html

[3] http://degreeoffreedom.org/between-two-worlds-moocs-and-assessment/

[4] http://www.insidehighered.com/news/2013/07/18/citing-disappointing-student-outcomes-san-jose-state-pauses-work-udacity#sthash.M5uRHFIJ.dpbs

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head of Coursera, declared to the Washington Times that: «Two words are wrong in "MOOC": massive and open»[5]. And again Hennessy says that MOOCs educational offer is too complicated or unattractive for most students. Additionally, even among traditional colleges and universities enthusiasm is being replaced by caution and skepticism: the Dartmouth College, which is aiming at delivering 4 MOOCs courses, wanted to stress the fact that these courses will not replace the corresponding traditional ones and that on-line students who will attend them will have the possibility to access the Dartmouth's courses, but they will not be able take part in the learning experience provided by Dartmouth. In August 2013, Professor Robert Lue of Harvard, among the first ones working at the edX project, stated that we already were in post-MOOCs era[6].

I think that today we need to place free on-line video lectures into the proper historical and cultural setting; they should be considered as new encyclopedias democratizing the access to knowledge and offering quality contents worldwide. Certainly, sharing materials is the first important step, since, as the Global University Network will develop, the amount of published materials will become enormous: digital texts and books, but also materials, such as notes on lessons, exercises, exam texts, video lessons can grow ever more and supply different perspectives and interpretations of a same content. Content collaborative creation is carried on exactly has it happens for Wikipedia distributed editors who cooperate in creating, updating and widening the items of this on-line encyclopedia; likewise lecturers can create new educational materials, through contents co-creation, relying on contents already available on the Web and sharing them with the entire world.

A platform in which all universities of the world can post their own contents and the students can interact with these contents and enrich them with their thoughts, thus creating new interpretations and this could actually allow the universities to become places for producing the global knowledge, without losing the local richness and characters. In a networked world, students can learn from the experts of the whole world and contribute, according to a collaborative learning process, to creating new knowledge. The sharing of the contents of different universities of the world can certainly represent a significant step towards renewal, but a further step

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goes beyond disputing and sharing ideas. Posting contents on the Internet resulted into the development of a new educational model that is actually bringing about a radical change in university teaching models, as stated by Harry R. Lewis, former Dean of Harvard College and professor of computer science: «My classes are generally video-recorded (…) students would prepare for class in their rooms, and would spend their classroom time doing what we usually call "homework"-solving problems» (Lewis, 2012); this is a new pedagogic model, that of the «flipped classroom», a model in which the teacher pre-assigns any kind of required training material, as homework, and spends the classroom time developing an interactive model between students and teachers. This model is widely acceptable since it allows for interaction among teachers and students enabling traditional universities to keep their role of special places where people cultivate the *Life of the Mind*.

We ought to further develop a new model of university taken as a whole, as a real and virtual place in which, both face-to-face than at distance, the experience and expertise of the teacher is transferred to the students by using continuous interaction models, interaction between students and teachers, youths and elders, experts and inexpert promoting a critical development of expertise and, as a result, of its transformation into knowledge. Creating an infrastructure for the higher education of the 21st Century involves adding to the university physical campuses a technological infrastructure allowing to easily develop a new model of University, a new pedagogic model and a new model of knowledge pro-

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[5] http://www.washingtontimes.com/news/2014/feb/9/big-plan-on-campus-is-dropping-out/?page=all#pagebreak

[6] https://www.edsurge.com/n/2013-08-13-envisioning-a-post-mooc-era

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duction and delivery that becomes ever more essential for the survival of the university. The creation of a global network for higher education in which teachers and students from different parts of the world participate in the collaborative construction of knowledge is not a utopia; today, in fact, universities can pool together to realize new contents and create an open system capable of updating itself and integrating all knowledge available on the Web, actually achieving an exchange of knowledge at global level, maintaining their spaces for real meetings and creating models of distance universities without distances.

## REVIEW QUESTIONS

(True or False)

- T  F   Video is always better than text for learning, no matter the design.

- T  F   Stimulate audio and visual perception is important to enhance learning experience.

- T  F   MOOCs will overcome traditional universities in the near future.

- T  F   Having no human tutor or teacher is a good way to manage thousands of students.

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