A manifest for the usage of videos in academic teaching.

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Abstract

We briefly outline the research directions for application of video to lecturing in a University setting , using a socio-constructivist approach.

Presentiamo una breve indicazione delle direzioni di ricerca legate all'applicazione di lezioni video alla didattica universitaria usando un approccio socio-costruttivista.

The use of video technology in education started very early. Even before TV became a mass phenomenon, there were instructional movies – for instance to demonstrate scientific experiments that were too complex or too lengthy to be performed in a school laboratory. They needed special equipment (a projector) and could be used when needed (i.e. asynchronously). The TV introduced some educational programs (and later channels). However, broadcasting imposes synchronicity constraints, which do not match the school organization. Hence TV was rarely used until the invention of the VCR, which brought the asynchronous modality to the "small screen". This allowed some distance universities to base their teaching on recorded lectures. The production of such lectures was expensive, and the result was… well, boring. Didactic videos have never been an outstanding success, at least until the recent MOOCS hype.

Computers started to come into the scene as soon as they had powerful enough CPUs and large enough memory to be able to store and play a stream corresponding to a digital movie, and screens with a sufficient graphic resolution. Digital technology brought some important added values. In first place, it made navigating a video much easier than it was with VHS cassettes or –even worst – with films, even though such functionality is far from being optimal. Early experiments [RON03] demonstrated that such feature plays an important role in the way students use videos. Navigability allows searching interesting spots, skipping sections, repeating portions of the video. In other words, it allows some personalization of the learning process, which is one of the targets often sought in computer-supported teaching and learning.

Another important enabler was the wide area network, which allowed distributing the videos in a more convenient and cheaper way than by accessing physical objects such as VHS cassettes, CDs or DVDs. The first experiments of using internet to distribute video for educational purposes took place.at the end of the 90's [HEY98]. After

that, we had Apple's iTunes, which around 2005 launched its iTunes-U[1] academic channels, with podcasts, webcasts and simple videos. It was soon followed by YouTube's academic channel. In more recent years we saw the MOOCS boom (or bubble? We do not know yet) and other successful initiatives like Kahn Academy. The notion of MOOCs entered in into the official dictionaries only recently: its entry in the English Wikipedia dates July 2011. A history of MOOCs in 2012, the year of the boom, is reported in a post by Audrey Watters[2].

On the MOOCS hype, much has been said, and we just recall here some numbers: the first MIT MOOC (MITx - 6.002x: Circuits and Electronics.)[3], boomed with 154,763 registrants. In the end, after completing 14 weeks of study, 7,157 people earned the first certificate (4,6% of the enrolled ones). The Coursera's Social Network Analysis class was even less encouraging. Out of the 61,285 students registered, 1303 (2%) earned a certificate, and only 107 earned the "programming" (i.e. *with distinction*) version of the certificate" (0.17%). Only time will tell us if it is real glory, or only a short season like the one of Second Life.

The above short historical excursus seems to show that Internet carried videos found their place in the educational arena, and that not much more has to be said on this issue. Such conclusion would however be wrong, as several other factors need to be discussed.

[1] http://www.apple.com/education/itunes-u/

[2] http://hackeducation.com/2012/12/03/top-ed-tech-trends-of-2012-moocs/

[3] http://www.i-programmer.info/news/150-training-a-education/4372-mitx-the-fallout-rate.html

In first place, it has to be noted that videos always assume a rather passive role for the learner: some material is presented, and the flow is unidirectional, going from the "knowledge provider" to the "knowledge seeker". This reflects the fact that traditional teaching (especially in introductory course at the University) is still almost always based of a transmissive pedagogy: lectures are typically frontal. Modern pedagogists oppose such model, proposing instead theories such as that of social constructivism, which is based on the Piaget, [PIA76], Bruner [BRU78] and Vygotsky [VYG78] ideas. According with these ideas, each student becomes the protagonist of his/her learning process.

Hence, rather than being a factor of innovation, technology becomes a conservative force. It is not an odd case: interactive whiteboards are another example of modern technology reinforcing old pedagogical practices [RON07].

This is not an inevitable fact. Technology does not bring by itself methodological innovation, but it is actually possible to use it to change paradigm.

For example, we proposed a methodology, which is an extension of the concept of "flipped classroom" adapted to the specific context of the European Universities. It is described elsewhere [RON10], but we briefly recap it here. The methodology assumes that the students' activity can be divided into three phases: Knowledge Acquisition (KA), Deeper Understanding (DU) and Knowledge Consolidation (KC). During the first phase, the student is exposed to the theory, ideas and knowledge. The student grasps concepts and models, and reaches s

first level of understanding. Later (DU) the learner "studies", that is s/he reviews the concepts, deepens her/his understanding, memorizes facts and formulas and applies the new knowledge by solving exercises. Finally, the acquired knowledge is consolidated by relating the new knowledge and models with that already possessed by the learner (KC). These phases were mapped the global workload that students have during an academic course. In the European Community, this is defined by the Lisbon Recognition Convention, which introduced the notion of a "credit": a sort of exchange currency that eases comparing courses offered by different universities and facilitates students mobility throughout the continent. A credit is defined to be equivalent to 25 hours of work, out of which, in the traditional approach, a third are spent in class. In the proposed methodology, for every time slot spent watching the video, an approximately equivalent slot is later spent in class, and a third roughly equal slot is dedicated to individual study. In class students become active, discuss, perform active work in a way that al least partially reflects the socio-constructivist ideas.

This also brings us to another issue: how are videos being used by students? The videos, or rather their usage tracking, can provide valuable information for the teacher, who has to structure the DU phase. In fact, analytics can provide answers to a set of questions, which in turn can provide relevant indications about where the focus should be in the activity performed in class. The most relevant questions are:

- Are students actually watching the videos on the assigned dates?
- Are viewers watching all the way through?
- At what point in the lecture, if any, do viewers stop watching?
- Are there any portions of the videos that are being watched repeatedly?
- Are the students watching the videos by the assigned deadlines?
- Do the videos generating active user engagement? Do students edit, share, download the material? If yes, which one?

The interpretation of the statistics may however be not easy. Knowing that the sequence on lecture N at time between t1 and t2 is often reviewed is not by itself a meaningful cue. What is there? To know, we need to view ourselves the fragment. When the potentially interesting sections or points are many, this may be a very time-consuming task. The problem arise by the lack of semantic information. Some help may come from a low-granularity structure of the material. For instance, if "lectures" are broken into small pieces, it is likely that each unit has a well defined semantics. Instead, if a lecture is recorded in class, and hence follows time constraints which are dictated by logistics rather than by content, things are much more difficult. In these cases, substantial help may come from certain ingredients that we claim to be important ingredients of the videolectures:

- multiple (parallel) cognitive channels,
- semantic marking,
- transcripts,

- annotations.

We do not have the space to describe in details these issues, and hence refer the reader to [RON13]. However, we want to point out that these are open research directions. In particular, an open environment where students can annotate video resources would be of great interest.

As a last point, we want to address the time and cost issues for producing MOOCS and video-lectures. They are known to be huge, and an effort has to be made to minimize them. Reusing what happens in the classroom during normal lectures might actually be a good idea, both in terms of cost and of results: Fritze and Nordkvelle [FRI 2003] showed that recordings of real lectures are more effective than lectures recorded in a studio.

Again, how to build a system that allows recording lectures in an inexpensive and effective way, using e.g. also mobile devices, is a research direction. We discussed elsewhere what the relevant parameters to be kept in mind when building or acquiring such a system are, and refer the reader to that paper [RON08].

Conclusion

We briefly outlined some research direction which will be the main objective of our contribution to the Città Educante project. The outline is necessarily sketchy due to space limit, but it gives an indication of the directions we want to proceed onto.

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