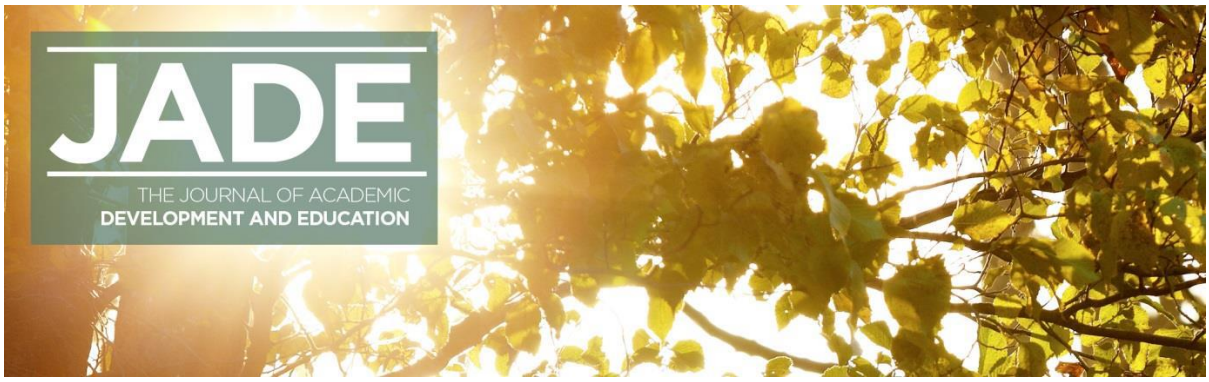

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Article:

A Case Study in large scale Video recording using Opencast

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A Case Study in large scale Video recording using Opencast

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Abstract

Universitat Politecnica de Valencia (UPV) is a 35000 students' higher educational institution in Spain, which has been interested for quite a long time in the application of technology into learning. Following that path, UPV applied as a member of the Opencast community for Lecture Capture and is using Opencast for several years. Being Opencast an Open Source project gives adopters a great amount of flexibility, UPV is using actively Opencast for different educational projects, like Lecture capture, Flipped Teaching and MOOC production.

Results of the experience shows that Opencast is a proper choice for Educational support, and also that satisfaction and academic results of the experience are quite good and no doubt a valuable improvement in a University environment.

Keywords

Video, lecture capture, educational technology, flipped teaching

Context and Objectives

Universitat Politècnica de València (UPV) is a 35000 students' higher educational institution in Spain, which has been interested for quite a long time in the application of technology into learning. Following that path, UPV applied as a member of the Opencast community for Lecture Capture and is using Opencast for several years

Opencast is an international community (Opencast, 2016), member of the Apereo network of institutions (Apereo, 2016), interested in developing systems and software related to Lecture Recording in education.

Opencast is also the name of the open source lecture capture and video management system which allows institutions to capture, process, manage and distribute video assets on a large scale. It plays with relevant academic systems and services and provides flexibility to meet the diversity of video management requirements we see today.

Thus, a university can have a working Opencast system deploying capture agents in the lecture halls to record simultaneously the teacher's video, audio and the screen that the teacher shows in the computer in the classroom, creating a multi-track recording, which can then be ingested and published through the core system.

Opencast, being an open source project allows an enormous amount of flexibility in the components deployed and the way of using them, so there each installation is somewhat unique. Here are the main choices for an opencast deployment:

Capture agent: the capture agent is the computer that actually records the video and audio in the lecture hall. There are different brands and programmes, both commercial and open source that provide such equipment.

Sound system: The sound system is related on how you capture the audio from the teacher. Common choices are a lapel mic that the teacher has to wear and power-on before the lecture, a table mic or a mic array.

This is a key topic in deployment. Lapel mics provide the highest quality if properly used. However up to 10% of recordings (in our estimation) are lost because of failure to power-on, incorrect placement, battery issues, etc. On the other hand, a recording with bad audio quality is useless.

A conservative choice is having two sound systems (e.g. lapel and table) and use the second as a backup system. Opencast don't provide automatic selection, so manual intervention is needed.

Cameras: There are three different setups, ranging from more expensive to less. You can use high-end tracking cameras, so teacher are automatically tracked in high size, high-end static cameras, focusing on the full podium and low end static cameras, with reduced quality.

Usually camera quality is heavily dependent on the lecture hall size, so better quality is required for larger rooms.

Recording mode: You can choose a manual start, where teachers have to start and stop the recording or make automated recordings for previous bookings or an external calendar system. For calendar-based systems, organisations may choose to opt-in (record upon request) or opt-out (record unless teacher complains).

Manual start allows teachers to control the recording, and also spontaneous ones, while calendar-based systems usually provide more valid recordings, since Teachers don't have to worry about anything.

Publishing points and LMS integration: Records have to be published somewhere for students to view. Opencast provide a local HTML portal, but provide a great flexibility in using external publishing points, like video portals or LMS integrations using LTI or Single-sign-on services.

Video player enhancements: One core feature of Opencast is the ability to enhance video content with accompanying material (slides, transcriptions, captions, etc.), and so requires an specialized content player. Currently there are two main choices for his: The official Theodul player and the alternative Paella player (Paella, 2016).

Opencast deployment for Lecture Capture at UPV

UPV history with Opencast began with a Lecture Recording pilot in the last semester of the 2011-2012 academic year recording in nine classrooms with 15 teachers, with 400 hours recorded. The production phase started in 2012/2013 and this year we have 67 lecture rooms, and we are recording around 5000 hours a year, with around 400 teachers involved. The local nickname of this project in Spanish is "Videoapuntes".

We chose to go for the opt-in automatic recording mode of Opencast, so the installation of this equipment has been designed to be as unobtrusive as possible to avoid the distraction of teachers. We use a ceiling microphone system that does not require teachers to wear anything. Teachers access the University calendar system to book a recording and the recording appear on the Sakai LMS upon completion.

Once uploaded to the LMS, the teacher has four days to review the recording, trim the start and the end, if necessary, and publish it using a web tool that is also available.

Finally the recording appears under the resources section on the course site. Only students pertaining to that course are able to access to those recorded lectures. This is done by using and integration with the University's authentication system and also allows us to know who and when has accessed a particular lecture. We use, and plan to use more, that data for usage studies and Learning Analytics.

Opencast deployment for fast in-studio recordings

Together with the Opencast core, UPV installed 6 small recording studios for higher quality recordings. Those recordings are meant for the usage in Blended and Flipped teaching projects and also for MOOC production. The local nickname for that service is Polimedia (Turro et al, 2010).

Thus, the Polimedia service allow UPV lecturers to record pre- prepared mini lectures to be used by students as a supplement to the traditional live lecture or in any other pedagogical content. For the most part they consist of concise overviews of a given topic and have a typical duration of around ten minutes. They are also accompanied by time-aligned presentation slides, or a time-synchronous live screen capture.

The production process for Polimedia videos has been carefully designed to achieve both a high rate of production and an output quality comparable to that of a television production, but at a lower cost, being a key feature of that the live editing, so records are available just upon finishing (plus a small automatic processing time in Opencast).

A Polimedia studio consists of a 4x4 square meters room with a white backdrop, video camera, capture station, pocket microphone, lighting and AV equipment including a computer to capture and mix the video and audio noise gate.

Currently we have recorded more than 16.000 videos form more than 1.800 different teachers, and they are available in UPV's media portal (MediaUPV, 2016).

Results and Discussion

In order to get an evaluation of the lecture capture experience we selected 10 courses of the first semester of the academic year (September to January) that have been using lecture recording in all or nearly all lectures. These 10 courses belong to different faculties and disciplines, ranging from an introductory course in Mathematics to different more advanced engineering topics. There are 3006 students enrolled on those courses.

The question that we try to solve on this analysis is if there is a measurable effect on assessment grades due to the use of the Lecture Recording tool. So we are going to divide the students in two groups: those that have viewed at least once any video and those that don't. While further classification could be done, we believe that this simple separation address more clearly the question proposed.

Then, for those 10 courses we have 2034 students that pertain to the "viewers" group, and had accessed the platform to see at least one video, being 67.6% of the global group. It is also worth noting that students didn't have any special pressure in viewing videos, it is completely up to them.

The details of "viewers" and "non-viewers" are depicted on table I. There are courses (5,7,8) with nearly full attendance where there are others (6,10) with quite low usage. The overall figure is related to the whole number of students.

Now we are going to focus on the actual marks of the students at the end of the semester. Marks are also given on Table 1 and run from 0 to 10, being 10 the highest.

Course	Viewer Students	Non-viewer students	Percentage	Viewers' marks	Non-viewers' marks	Difference
1	433	89	82,95%	5,82	5,76	1,09%
2	324	78	80,60%	6,50	6,46	0,63%
3	308	88	77,78%	6,28	6,36	-1,25%
4	298	78	79,26%	7,38	7,20	2,38%
5	264	1	99,62%	6,46	8,10	-25,39%
6	179	472	27,50%	5,78	5,37	7,15%
7	106	2	98,15%	7,13	5,50	22,83%
8	47	0	100,00%	6,62	-	-
9	38	30	55,88%	7,66	7,78	-1,57%
10	37	134	21,64%	6,50	5,92	9,02%
Overall	2034	972	67,66%	6,44	5,80	9,91%

Table 1. Results of the Lecture Capture experience

Here we see that there is some disparity between groups, but on the overall sample we have a 9% difference in terms of using the Lecture Recording system, that given the size of the sample can be considered like a positive indicator of correlation.

While this correlation is interesting, we can get a better knowledge of what is happening by looking at the distribution of marks. On Figure 1 we show a histogram of the marks over the full sample of students.

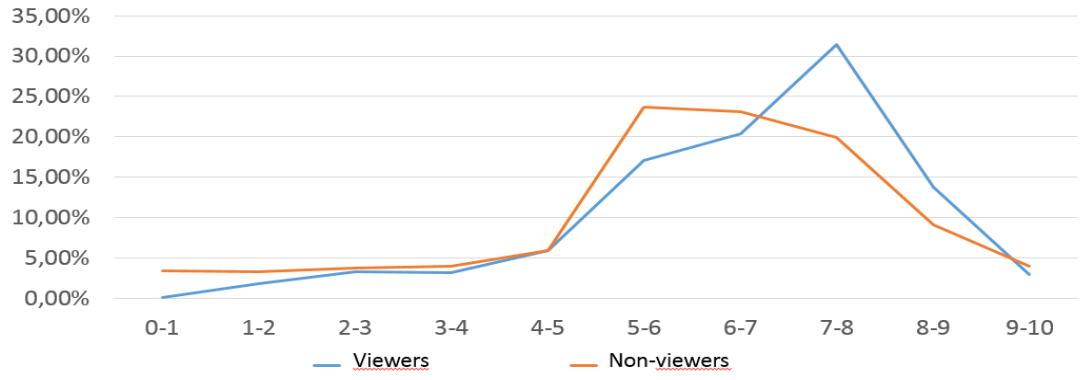

Figure 1. Academic results of Opencast Lecture Recording

Looking at that figure we see that there is a displacement of the peak of the graph between viewers and non-viewers, while the left and the right side keep pretty similar. Our explanation on that is that Lecture Recording usage helps more to middle level students than to high and low level students, probably because high level students

already know the topic enough and low level students are too far on their knowledge to be helped by only having the recordings available.

In the 2015-2016 academic term UPV moved a step forward in applying Flipped Teaching to its courses, by planning a large-scale deployment of more than 100 courses with around 200 teachers involved. Teaching is done on two semesters, and for the first semester 45 courses were flipped.

In our case we define the flipped classroom as an educational technique that consists of two parts: computer-based individual instruction before the lecture session and interactive group learning activities inside the classroom in the time that was set up for lecturing in standard courses. It's worth noting that we don't restrict this definition to employ videos as an outside of the classroom activity.

Teachers that apply for the flipped teaching project have a learning session in which they get the directions to apply the methodology in their courses. However, while they are encouraged to use videos they are allowed not to do it and rely in more conventional techniques like HTML content on the University's LMS platform or even PDF files. Nearly half of the teachers decided not to use videos and stick with that semi-traditional approach.

So we can classify the courses because of why they are distributing the previous content in 5 different groups, belonging to two main families: video and non-video. Usually video supported courses also include HTML and PDF content.

Video family includes three types: Screencasts (Homemade recordings made by the teacher commenting the slides and teacher's computer desktop), Polimedia and Other Videos, and Non-video family includes courses with only HTML or PDF content.

The 2015-2016 experience, in the first semester, got evaluated 45 Flipped Teaching courses, with 2668 students involved.

In order to evaluate the experience we did an anonymous survey to the students of those courses, divided by courses. The survey included a broad number of questions, some related to the a priori learning beliefs of the students, some to the overall structure of the experience and finally on the students' perception on the value of the Flipped methodology.

While there is quite information in the survey, we use a question (Q8: I'm very satisfied with this experience/methodology) as a proxy estimator for students' satisfaction.

This can be compared perceived value of the students, the results that we get from that by type of content is depicted on table 5.

Family	Type	Number of courses	Enrolled students	Mean (1..5)	Sigma	Median (1..5)	Mean(1..100 value)
Video	Screencast	4	234	4,06	0,70	4,30	77%
	Studio recordings (Polimedia)	21	1308	3,98	0,67	4,08	74%
	Other videos	4	221	3,32	0,73	3,41	58%
Non	Only HTML	14	657	3,27	0,77	3,26	57%

video	content						
	Only PDF files	2	248	3,25	0,74	3,19	56%
Total		45	2668				

Table 2. Perceived value of Flipped Learning

This table clearly shows a great difference between video and non-video supported Flipped Teaching. Acceptance rates for non-video are just fair, that means that video should be a must in considering these experiences.

Also there are no significant differences between the videos recorded by the teachers themselves and the studio recordings. Our guess is that while the recorded videos are of more visual quality, they lack the capacity of be changed during the learning course, so in the Screencast paradigm, teachers can adapt faster to students' needs. In any case, this is a topic that calls for further investigation.

In some courses of the experience we had the situation that we have some groups using Flipped Teaching and some not, because they had different teachers. However, the assessment was common, so we can compare the assessment in using Flipped Teaching and not using it. Such results are depicted on Figure 2 and show better assessments from the Flipped students.

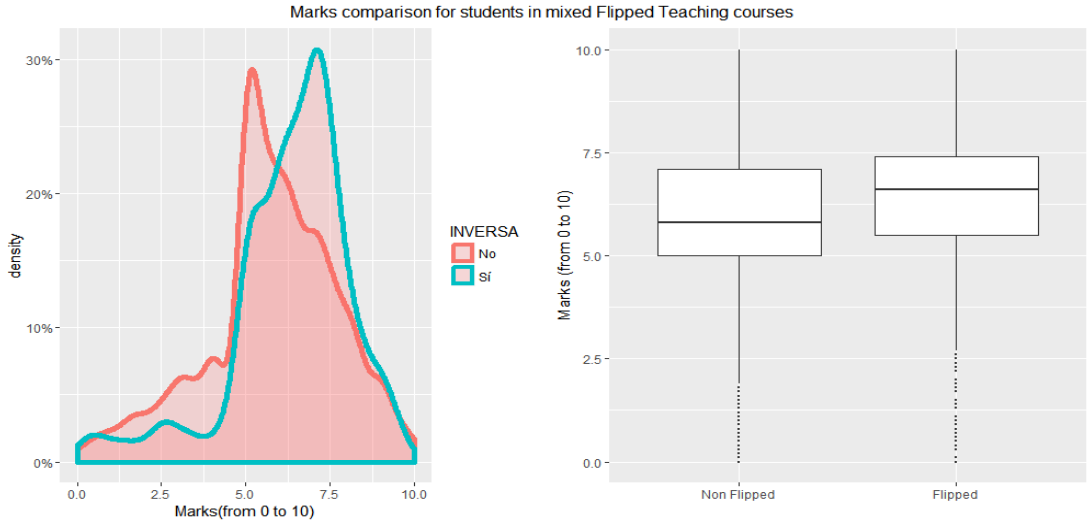

Figure 2. Marks comparison in mixed Flipped Teaching courses

Conclusions

We have presented a case study on how the Opencast lecture capture system can be applied to enhancing teaching in a higher educational institution. Results show that having lecture recording available is not only an opinion of the students, but it carries out better performance.

Opencast also can be used to help teachers to create content for other methodologies, as is our case regarding the Flipped Teaching experience we are carrying on.

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