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How to move beyond lecture capture: *Pedagogy guide*

Clive Young & Sylvia Moes



**How to move
beyond lecture capture:**
Pedagogy guide

Clive Young & Sylvia Moes

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2. Foreword

“The uninspired label “lecture capture” fails to convey the disruptive potential of this tool”

(Russell, 2012)

This report is one of the outcomes of the REC:all project (2011-2013), supported by the European Commission under the Life Long Learning Programme, that aimed to challenge the prevailing view of lecture capture as a passive recording method.

Many universities and colleges now record their live lectures and put recordings online in order to enhance the student experience by providing better access to teaching events. Usually the recorded material is presented in ‘classical’ traditional linear formats which at first glance do not suggest a pedagogically innovative approach. In this report we will challenge that view and then explore new pedagogical implementations of lecture capture which we suggest may even warrant the name “Lecture Capture 2.0”.

The technology of lecture recording is also evolving rapidly, for example modern systems enable the linking in of social networking tools, and custom-made rich media ‘knowledge clips’ are also increasingly being made available through the systems. Even more significantly we are beginning to see students themselves using institutional systems in the creation of video clips both as learning resources and as part of formal assessment.

Lecture capture is thus emerging as a core institutional technology for generating media-rich educational resources for blended and virtual campuses. REC:all provided an opportunity to explore new ways in which lecture capture could become more pedagogically valuable and engaging, and the project investigated learning design, technical and legal issues.

The project findings have confirmed our original belief that lecture capture can offer unprecedented opportunities for reflective educational practice. Moreover the case studies have shown that the technology provides a practical and engaging path for teachers to develop their awareness and capability in using video and other media to enhance teaching and learning. Starting with conventional or classical lecture capture is often just the first step in this process for teachers; many of whom rapidly progress to try out new participative ideas such as 'lecture flipping' and student-created video.

The risk for the higher education sector is that without the awareness and promotion of such progressive models and approaches the opportunity for using lecture capture technology to seed this type of pedagogical innovation may be lost.

3. The REC:all project

REC:all researched how lectures are currently being captured and used, explored learning designs for flexible and off-campus delivery, and reviewed technical, pedagogical and legal issues with an aim to producing practical guidelines such as this one to help teachers.

The project has developed an active community of practitioners in this exciting area [www.rec-all.info/] working with existing academic communities such as ViTAL (UK) and OASE (Netherlands).

As part of the project 15 case studies were developed with focus on how various forms of lecture capture; knowledge and instruction clips, interactive live webinars, can help to intensify learning. We also investigated how these learning materials can be integrated best way into courses. The case studies originated from four universities; University College London (United Kingdom), VU University Amsterdam (The Netherlands),

Université de Lorraine (France) and Universitat Politecnica de Valencia (Spain). These case studies were chosen with the aim not only to improve the learning in the 'traditional' classroom, but how the technology and approach can contribute to a blended learning context.

The REC:all partnership consisted of: University College London (UK) - Project Leader, ATIT (Belgium), Université de Lorraine (France), Vrije Universiteit Amsterdam (Netherlands) and Universitat Politecnica de Valencia (Spain).

4. REC:all and the Lifelong Learning Programme

REC:all was designed to address a number of objectives of the **Lifelong Learning Programmed Objectives**, mainly "to support the development of innovative ICT-based content, services, pedagogies and practice for lifelong learning". As will become evident in this report, lecture capture has become an increasingly important mode of delivery in lifelong learning in our partner institutions and the sector more widely.

REC:all explored student needs and provides guidelines for teachers to enable innovative and interactive educational designs that exploit the potential of this new technology. We demonstrate the particular educational characteristics of lecture capture, and video generally has perhaps a unique affordance to reinforce the contribution of higher education and advanced vocational education to the process of innovation. Lecture capture is itself a facilitator and motivator of change.

Students in advanced vocational education increasingly demand more flexible and personalised modes of study. Lifelong learners increasingly have to balance with work and family commitments. We know lecture capture provides an innovative way to allow time and space-independent access to resources. However to engage such 'remote' learners we have to move beyond 'classical' uses of the technology. **REC:all** encourages innovative application of lecture capture to ensure it is engaging and valuable to students.

The **REC:all** project brought together experts in five EU countries who are already active in this area in order to facilitate the development of innovative practices in education and training at tertiary level, and through dissemination and an active network of practitioners help transnational dissemination. We believe the project activities, especially the case studies, have supported the development of innovative ICT-based content, services, pedagogies and practice for lifelong learning. We have identified the challenge in this sector to ensure that new technologies open new opportunities and modes of learning rather than continue inflexible practices.

5. Introduction

5.1 What is lecture capture?

"Once viewed with caution as a potentially intrusive intervention that might cramp teachers' style, lecture capture is now proving its worth for teachers and learners alike in many contexts."

Association for Learning Technology (2011).

Many universities and colleges now record their lectures and making them accessible online via their virtual learning environment (VLE) and 'lecture capture' or sometimes 'web lectures' represents a significant investment in resources and staff time. In the project this was called 'classical' lecture capture. The underlying rationale given is often to enhance the student experience by providing better access to teaching events, but there is still relatively little research into how viewing videoed lectures can actually enhance the learners' experience or improve their learning outcomes.

Lecture capture systems require rooms to be installed with a set of multimedia equipment, networked to a central server running the recording and delivery application. A video stream of the presentation area (i.e the lecturer or presenter) is recorded via a small usually fixed-position camera at the back of the room and audio is captured via a lapel radio microphone. In addition the data that is sent to the room's projector from any connected device is also recorded. Thus PowerPoint slides from an attached laptop or hand written notes or objects held under a digital visualiser can also be recorded and synchronised automatically to the video and audio stream. Lecture capture sessions are usually pre-booked, run automatically and are not attended by technical staff. The only requirement of the presenter is to adhere to the timetabled scheduled and make correct use of the radio microphones.

The subsequent recording is stored on the central institutional system and the presenter can log in later to make minor edits and publish the media file usually to the institutional VLE or as a downloadable file for use on mobile devices. Students can access the synchronised presentation and pause, fast forward and rewind navigating via thumbnail images of the slides (See Fig. 1).

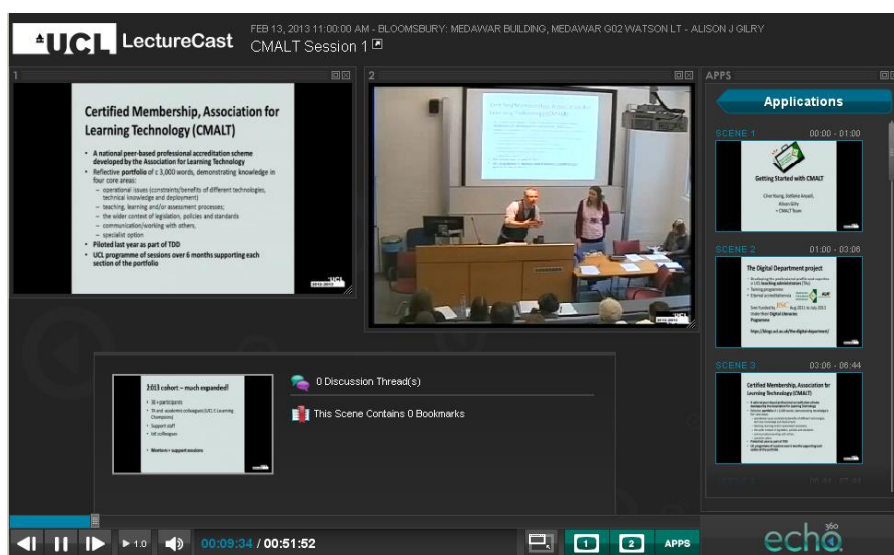


Fig. 1

5.2 The impact of lecture capture

Ease-of-use, together with more competitive pricing, has lowered the barrier for adoption in institutions, but it is very popularity among staff and students have raised questions about the educational value of this process. A recent literature review by Secker et al (2010) drew attention to several recurring themes, ranging from the pedagogic to the pragmatic.

5.3 Popularity among academics

At UCL, the REC:all project leader, lecture capture was initiated as a pilot project five years ago when Echo 360 (rebranded as "Lecturecast") was adopted. In the intervening time it has grown rapidly as a service and is now installed in 62 lecture theatres. The importance of this is that the remarkable growth has been led by demand from our lecturers. A few departments record all lectures, but most leave choice to the individual lecturer. At about 6000 teaching events recorded last academic year 2012-13, about 20% of all lectures. We were recording 200,000 student views of recordings before we reached the peak exam period, amounting to an average of 10,000 views per week.

5.4 Student attitudes

The growth of lecture capture at UCL has also been due to very positive student's attitudes to lecture recording. In a recent survey (Digges 2011) one stated a typical view that "I would like to see more videos of lectures on Moodle, as this will be very useful come revision in March and April" and "it would be useful to have all the lectures recorded as a matter of course". Student attitudes towards recorded lectures in the literature are almost always reported as positive (e.g. Russell and Mattick 2005, Konsky et al 2009, Karakostas et al 2010), but the more pedagogically interesting aspect is what effect recording has on the lecture and how viewing recorded lecture material influences learning.

5.5 Effect on attendance

Interestingly the most frequently expressed concern from academic colleagues seems to be quite pragmatic; the effect of lecture capture on student attendance to the live events. However at UCL, the lead partner for REC:all, "the experience of lecturers at UCL involved in the pilot phase of the [lecture capture] project is that the capture of lectures has little or no effect on student attendance" (UCL 2011). This observation is generally supported by the literature. Russell and Mattick (2005) found that with streamed lecture capture there was indeed a steady dropping off of attendance but emphasised it "follows the same pattern with or without streaming". Similarly von Konsky et al (2009) researching audio podcasts noted a tapering off but "anecdotally, this attendance pattern is consistent with that experienced in previous semesters" and concluded unequivocally that lecture recording "did not have a significant impact on lecture attendance".

It should be noted however other studies (e.g. Chang 2007) do report a more significant attendance problem, and anecdotal evidence suggest this can occur. However the nature of the live lectures may be a factor. As the UCL lecture capture website mordantly advises "if for example a lecture is little more than the repeating of notes from a PowerPoint presentation it is probable that some students will choose to spend their time more efficiently i.e. viewing the material on-line and saving the extra time spent on travelling to and from the lecture venue" (UCL 2011).

5.6 Effect on the lecture (and lecturer)

Students seem well able to distinguish the different educational utility of the live event and the recording. While students certainly appreciate the accessibility of recordings Russell and Mattick (2005) note "no student has said it replaces the real thing". But UCL lecturer Jonathan Wolff (2011) expresses another commonly heard concern; "Web-casting lectures provides students who failed to get out of bed with another chance. But there might be hidden costs. Video and live performances differ, not unlike spoken and written language. The video is on your permanent record, the lecture is here only for today. Might we see lecturing styles change to look better on the video, possibly to the detriment of the live performance?"

As can be seen from Fig. 1 the recorded lecture presentation format is quite restricted. Fardon (2003) notes that recorded lectures may be "better suited to certain lecturing styles and therefore certain disciplines". He suggests lecture(r)s that are logically organised with clear learning objectives and make good use well-prepared visual aids are more likely to work in the recorded format. 'Content-driven' lectures may actually be considerably enhanced as students can review segments of the lecture in detail. Similarly oral, narrative-driven lectures such as in law, humanities and social sciences may also work well, even as audio podcasts. On the other hand more 'dramatic' lecture(s) that make use of body language, movement and high levels of contact and interaction with the audience may not translate very well at all.

5.7 Is lecture capture too passive?

Lecture capture has grown rapidly at a time when the lecture itself is seen by some as an outmoded pedagogy. Jouvelakis (2009) warns "it could reinforce a transmission model of learning" (i.e. passive, content oriented, teacher centric) in a climate where more constructivist models of learning are favoured (i.e. active, process oriented, learner centric). Jones (2010) comments wryly "the zone of intersection between the didactic lecture and constructivism is not a comfortable one". The perceived passivity of lectures as a learning experience may be reinforced if they the live event is reduced in any way to fit the recording format. Moreover as Brown and Race (2002 p 24) acknowledge, lecturing is too often associated with positivist attitudes to knowledge, "an assumption that there are known and relatively unchangeable truths that can be passed on to students in their entirety". Chang (2007) considered that viewing recordings of an already-passive mode of delivery may not be a step forward and O'Donoghue et al (2007) argued we should instead be moving educational designs "from a passive lecture transmission to more engaging and collaborative forms of learning".

However, as Fardon (2003) notes, the lecture is only ever part of any programme of study and we should also consider "how students and teaching staff use the face-to-face lecture and the Internet-based recordings in the context of the overall teaching and learning programme". Moreover, there is a growing interest in identifying and encouraging active patterns of student use of these resources. Karakostas et al 2010 describe lecture capture as "a blended learning tool" that can "facilitate a flexible self-paced mode of learning", for example by enabling pre-lecture and post-lecture activities. Thus a prominent slogan on the Echo360 web site (2011) was "Beyond lecture capture: blended learning" and this may be more than a marketing ploy.

Recent research (Davis et al 2009) also suggests students demonstrate a more sophisticated interaction with the recordings than hitherto supposed and found students "understood how to use the materials and adapted them for independent active learning" and we will look at this aspect in detail in the next section. Moreover newer versions of lecture capture software lends itself to notions of 'social video', linking in VLE and social networking tools to enable discussion of educational 'hot spots' in the video resource.

6. Towards a model of active learning

One of the challenges to the pervasive perspective of passivity has come from Davis et al (2009) who describes the impact on lecture capture in two undergraduate engineering modules at the University of Leeds and "the potential impact that allowing students to revisit content post-lecture might have on teaching". The authors refer to the 'Three Is framework' (Thornhill et al., 2002, Asensio et al., 2004) which is a model to unpack the educational value of video resources. This framework will be explored in some detail with reference to lecture capture as it is one of the two foundational underpinnings, alongside the OASE initiative (see below), of the REC:all project. The Three I's are

- *image* - the power of the moving image as an engaging educational medium
- *interactivity* - control and access
- *integration* - with other technologies or in a blended environment.

These will be discussed in turn and applied to lecture capture.

6.1 The power of the Image

It is hard to argue with Thornhill et al.'s assertion that "moving images add authenticity and reality to the learning context, and can bring the course alive" (p.10), and indeed the authors provide ample support from the literature for the general educational power of video. However does this really apply to the same extent in lecture capture, where the video element may be a small window containing a blurry lecturer quite far away

from the camera? It is arguable but as Thornhill et al note "It is not only the visible explicit meaning of the moving image themselves that are important" and refer to the motivational aspects of video which "seems to have an emotional resonance to the senses". Hempe (1999) highlights the strengths of video as visual demonstration, dramatisation, presenting visual evidence and making and emotional appeal. Maybe even a small video window can carry hidden or semi-hidden messages such as narrative, emotion, authority, authenticity and symbolism. Some academics 'perform' particularly well in a lecture context and their delivery can be still engaging even when recorded at quite low resolution. In recent research using eye-tracking analysis of lecture capture environments, Kukkonen (2012) noted that despite the content being accessed primarily through sound and still images of slides, students still glanced regularly at the video window. The author felt that this visual reference may be especially important to students who were unfamiliar with the lecturer's style. Kukkonen's studies are ongoing but indicate that in the complex visual environments provided by lecture capture systems video may provide subtle clues or cues to the learner that should not be dismissed lightly.

6.2 Interactivity

We have become so accustomed to accessing and reviewing video on personal devices and desktops it is hard to remember what a significant step-change interactivity was in the way we use video for education. According to Rosenberg (2001) who documented this transition, interactivity comprised

- *access*, in lecture capture terms access on the student's own desktop or devices
- *choice*, the facility to access material non-linearly through menus, search etc and
- *control*, the ability to start, stop, pause and review the material.

The power of lecture capture systems to convert almost instantaneously previously ephemeral events into artefacts students can (and do) interact with is of significant pedagogical as well as practical significance. Students are no longer passive consumers. As Davis et al. (2009) recognise, this specific interpretation of interactivity implies the students are active consumers, indeed in his research "students were actively choosing specific sections of content to review rather than passively revisiting entire lectures". Davis et al considered this "an active learning activity [that] provides them with additional control and interaction with the material". This is worth emphasising as the REC:all project has found that students interact with the recorded material in sophisticated ways that would be impossible in a live lecture. They rarely watch a complete recording but replay only sections that cause difficulty, they may watch and discuss the recording with fellow students, they may pause the video at key points to anticipate 'what comes next' then check what the lecturer actually does or says. All of these point to a level of engagement that belies initial presumptions of 'passivity'.

6.3 Integration

Although lecture recordings can be used on their own, for example downloaded onto a mobile device, they are usually delivered as part of a virtual learning environment (VLE) such as Moodle or Blackboard. The recording can easily be interlinked with supporting texts, discussion boards, chat, resource links, self assessment quizzes and so on. Some of the newer lecture capture systems allow commenting and social tagging of points along the media timeline, and may soon include quizzes and other interactive tools. Time sensitive tagging in HTML5 offers even more opportunities for dynamic linking between a video and supporting resources. As Asensio and Young (2002) noted even in the restricted functionality of a decade ago demanded a new type of visual and digital literacy from the educational designer. They added that the underlying pedagogical theories we use to interpret new technologies had also shifted from a 'knowledge transfer' model to a 'constructivist' model, implying yet another layer of learning design complexity (c.f Jovelakis 2009 above).

As von Kinsky et al (2009) remind us "physical presence during a lecture does not mean that a student is paying attention, synthesising new information in the context of prior understanding, or developing insights that will foster learning. Similarly playing a lecture recording does not necessarily mean that learning will take place". The aim of 'integration' is as ever for the lecturer to encourage the students to engage with and reflect on the knowledge in the lecture, whether live or recorded, and put it to work.

Excellent resources are now available to help designers think about how to integrate video generally such as *dial-e-designs* (JISC 2007) which suggest 'integrated' video can be used to

- Prepare or motivate
- Collaborate on and further explain
- Recall and integrate
- Lead-in to an assignment
- Learning guidance and strategies
- Content to encourage analysis

The REC:all project aimed to develop an approach to 'unpack' this challenging area specifically for lecture capture, drawing on a number of pedagogical models as well as earlier projects. In a broad learning design sense Laurillard et al (2000) provide a useful approach based on Laurillard's well-known characterisation of learning processes as a 'conversation' between teachers and students (Laurillard 1993). Her learning conversation operates at two levels, discursive and interactive, linked to the twin processes of adaptation and reflection. In a complex, non-linear learning environment, the key aim of learning design is to maintain a strong narrative, in collaboration with the learner. "Teachers and designers must be clear what kinds of learning activities it takes to understand a topic, and then create the affordances for those activities." By *affordances* she means the characteristics and structure of the learning environment and resources that enable the student to learn about the topic, including for example providing explicit goals, opportunities for reflection and feedback on activities. As we explore some of the various forms lecture capture is beginning to take, we should remember this emphasis on a clear educational *narrative*.

If we adopt the notion of lecture capture as part of a blended learning environment and the constructive, student-centred model of interactivity described above as an active form of "engagement", lecture capture may be much less conservative pedagogically than it initially seems. Our students may understand this instinctively, as von Kinsky et al (2009) note "if students perceive that if something is of value to their learning, they will tend to use it".

6.4 Input - a fourth 'I'?

Since the Three 'I's Framework' was originally developed a decade ago there have been interesting developments in the practical application of video with students. Young and Meldgaard (2006) noted that there is in particular a growing focus on encouraging students to develop their own video. Allam (2006) observes that the creative challenge of using moving images and sound to communicate a topic indeed engaging and insightful, but adds that it also enables students to acquire a range of transferable skills in addition to filmmaking itself. These include research skills, collaborative working, problem solving, technology, and organisational skills. When properly embedded in a sensibly constructed classroom activity, for example as a project based learning activity, it combines the different elements of skill, competency and knowledge acquisition in a constructivist manner using tools and technologies that are relevant for and engaging today's learners. Again, this requires additional preparation from the teacher (or team of teachers), who will not only have to be skilled in the subject matter, but also in the media technologies and in the art of teaching media with and for media (VideoAktiv 2006). A balance clearly has to be struck between learning about filmmaking, learning about the subject and acquiring other relevant skills, but combined with the growth of community sharing of video we may be seeing the emergence of a quite new paradigm in the educational use of video. In

recognition of this significant aspect to educational video a fourth 'I', *input*, is sometimes added to the 3 Is framework.

7. Pedagogical models

“Students can learn lower order learning goals outside the classroom. Higher order learning goals need a context “

(Sealfon, 2012)

As we have seen, lecture capture has emerged as notions of 'meaningful' learning with digital video has been evolving rapidly (see Karpinnen, 2005 for an overview). The original 3 Is framework drew on a number of theories, but when working with practitioners the originators have found that the well-known Bloom framework provides an accessible starting point for discussion.

Although much criticised and challenged by educationalists and learning technologists since it was first described half a century ago, Bloom remains an enduring if not especially endearing feature of the educational landscape. Most practitioners in schools, colleges and universities seem to have a 'folk' understanding of and an affinity towards its simple description of 'levels' of learning. The 4 I's can also be mapped against Bloom (Fig. 4) and this framework also provides a useful steer as we explore the REC:all framework in the next part of this guide.

In some of the case studies the project also drew on 'active learning' models such as Sealfon (2012), Fink (2004) and others. This is a very similar hierarchical mapping to Bloom. In order to integrate a combination of various 'levels' of learning into the courses, the project investigated a range of higher and lower order learning goals for each case study. The lower-order learning goals are for e.g. understanding / remembering. These are followed by the next level of learning like applying/analysing and the higher higher-order learning goals as creating and evaluating, to achieve deeper learning.

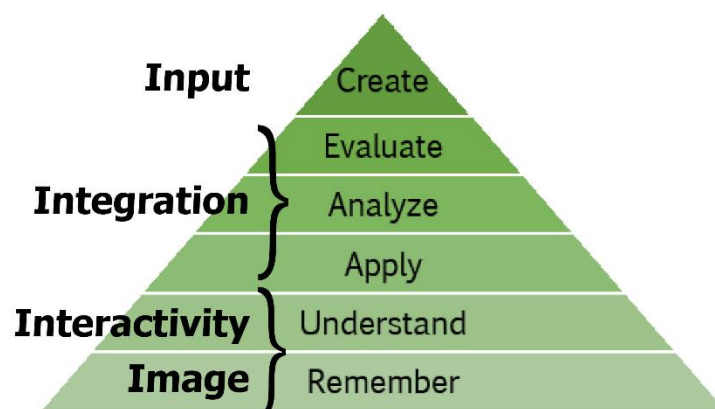


Fig. 2 Bloom and the 4 Is

8. Video and innovation

The REC:all project was surprisingly timely. As we were developing our models over 2012 and 2013, two video-rich approaches to teaching and learning became widely discussed in our four academic partner institutions, and indeed across the sector. These were screen capture, 'lecture flipping' and Massive Online Open Courses (MOOCs). Both initiatives made the REC:all ideas far easier to promote in our institutions as the academic

imagination was fired by external influences – both were widely discussed in the press and academic publications. Several of our case studies involved variants of flipping and although the project was not directly involved in the development of MOOCs the REC:all team followed the debate and even completed several MOOCs to look at the video aspects, an area that has been under-reported despite the remarkable hype around MOOCs in general. Both areas are developing and changing rapidly, so the sections below are simply 'snapshots' of current practices and perspectives and are based on blog posts from the REC:all project lead.

8.1 Screen capture

Over the last few years we have seen a remarkable growth in the use of screencasts at UCL. A 'screencast' is simply a dynamic video recording of live computer screen activity. Unlike a screenshot, which is basically a static image, screencasts capture video sequences of clicks and screen changes often enhanced with an audio explanation. The audio can be captured 'live' or added on later.

The method was first popularised in the 90s via the Windows tool ScreenCam (formerly Lotus ScreenCam) designed for software demonstrations and tutorials. Like all modern screencast tools, ScreenCam allowed various visual effects such as zooming, highlighting and labelling to be added. Its main advantage was ease-of-use, requiring no knowledge of video editing and soon became widely used by teachers as a way of converting of PowerPoint presentations to short movies in the Adobe Flash format.

In the last decade there has been an rapid growth of screen casting tools, some downloadable like ScreenCam to a PC, Mac or mobile device but many others now recording directly to the cloud so that they can be published via social media. UCL's institutional system Echo360 (Lecturecast) includes a screencast facility as part of its lecture capture tools, allowing academics to create short videos without needing a live lecture setup. This has provided a logical 'next step' for colleagues inspired to move beyond conventional lecture capture, and many use cloud-based services such as YouTube and Vimeo in addition to publishing via the lecture capture system.

Such recordings have been used among REC:all partners in a number of ways, for example:

- To 'flip' lectures – i.e. pre-record a lecture, publish this material along with an associated feedback channel e.g a VLE forum or the inbuilt discussion facilities in some systems and use face-to-face time to clarify and discuss issues picked up through student feedback.
- To produce supplementary materials to live lectures (see next section).
- To record talks introducing and contextualising areas of study – e.g. talks to students that help to inform choices regarding their direction of study.
- The production of materials for distance learning.

Davis and Hardman (2012) reported on how short Echo 360 screencasts (up to 10 minutes) could supplement 'conventional' teaching such as lectures and labs. They found a number of uses, contextualisation (associated with 'flipping'), assessment preparation and cohort-level feedback. The approach seemed to be time-saving, students were happy with the 'rough and ready' production values of screencasts and the project identified some difference in marks when students used the the contextualisation screencasts.

8.2 Lecture flipping

One of the most surprising e-learning phenomena in the sector over the last year has been the rapid rise and widespread adoption of the term 'flipping'. Flipping involves an interesting redesign of 'traditional' teaching. Students are asked to view and sometimes comment on a short video online to prepare for a tutorial or

seminar. The idea is they then come to the live event immediately ready to discuss in more depth the issues raised or apply those ideas in practical problem solving or group work supported by the academic. The videos can be all or part of a recorded lecture or be specially prepared using for example a narrated Powerpoint presentation. They can be supported by many kinds of online resources such as e-readings and quizzes.

Although the idea has been around since at least 2006, used by Eric Mazur at Harvard and others, the US high school teachers Jon Bergmann and Aaron Sams are often credited with starting the movement. In the UK the idea received a boost in a prophetic 2010 Daily Telegraph article by Daniel Pink on 'flip thinking', but it was Salman 'Kahn Academy' Khan mentioning "teachers flipping the classroom" in his 2011 TED Talk "Let's Use Video to Reinvent Education" that popularised the whole concept. The influential Wired magazine then accredited flipping as a key trend in an excellent 2012 article University just got flipped: how online video is opening up knowledge to the world which itself forecast the rapid rise of the MOOC.

The idea of getting students to prepare properly for tutorials is hardly new and as the e-learning blogger Steve Wheeler (2012) pointed out at the time, there may be risks involved if incomplete flipping perpetuates old 'instructional' models. He presented an attractive notion though that "Flipping learning for me means teachers becoming learners and students becoming teachers" which seems the logical 'next step' for flipping, an idea I will return to in a later blog post.

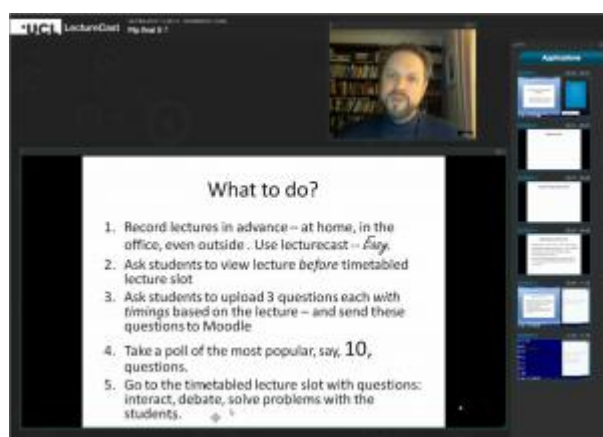


Fig. 3 Flipped learning resources at UCL

One of UCL's great advocates of flipping at UCL is REC:all case study lead Carl Gombrich, Programme Director, Arts and Sciences (BASc) who flipped extensively from the outset of his Approaches to Knowledge course to engage students in cross-disciplinary discussion. Carl explains his approach earlier this academic year in his blog post Flipping lectures – reflections on a term of learning.

In a Times Higher Education / Echo 360 webinar E-Learning to Active Learning: Transforming the Learning Environment (2013) Carl explained how he uses the UCL desktop recording (EchoCapture Personal) software, part of Lecturecast, to create his video segments. In the presentation Carl highlights some of the 'good things' he considered about flipping:

- Students can interact with lecturers on questions that interest them/problems they want to work through.
- Students/lecturers get better relationships in terms of mentoring/personal contact etc.
- Active learning: lecture times can be used for summative assessments: short tests, blog pieces, group work, debates.

8.3 MOOCs

The most high profile educational technology innovation that emerged as the project was running has been MOOCs (massive open online courses). Although there are many types of MOOC, video is usually a major part of MOOC design, providing an important 'human touch' and authors are actively testing different formats. As we saw in the 3Is analysis in Section X, this is hardly surprising, and builds on the well-known benefits of educational video.

One interesting question that frequently arises, however, is **what quality does the video have to be?** We are all used to the very high production values of BBC documentaries but most of us have now also viewed wobbly, fuzzy YouTube clips to learn pretty effectively how to do some specific practical tasks.

8.4 The developer perspective

So what is the right approach? REC:all project lead Clive Young attended a US MOOC conference in April 2013 and in his REC:all role asked a range of MOOC developers how they were creating video resources.

There seemed to be no 'magic formula' for making video.... methods ranged from engaging an expensive professional 'videographer' through lecture hall capture quality to cheap-and-cheerful laptop DIY screencasts. Intriguingly nor was there a consistent user response reported. Some students liked the glossiness of professional production, but just as many others felt engaged with the authenticity of warts-and-all desktop recordings.

What seemed to be more important was **finding a format the lecturer was comfortable with.** What process or set-up enables his or her teaching personality to shine though? Some MOOCers reported a 'deer in the headlights effect' when lecturers were presented with an array of lights, big cameras and fluffy microphones. If not natural performers some academics were much more comfortable, natural and effective via a lo-fi recording made in their home or office. DIY video also cuts down on editing time. Lecturers know what is important and shoot just that, so minimal editing is needed. Professional camera people on the other hand tend to record much more footage then have to do more editing, adding to the overall expense.

Several MOOC developers suggested that **if resources are limited (as they always are), it may be better use the professionals only for difficult or high-stakes shooting.** Outside camera work, shooting real-life examples, complex lab work, long-life instructional videos, one-off interviews with prominent experts, marketing material and so on may all be a better use of camera person time than getting them to record simple 'talking heads'.

One of the reassuring aspects of this use of video in MOOCs is that **rather than undermine the role of the lecturer it actually seems to reinforce it.** The power of academic narrative remains strong even in an electronic environment. By enabling 'inactivity' through selection, pause and rewind good lectures can be transformed from an ephemeral experience to a powerful learning resource.

8.5 The student perspective

To test this theory on behalf of the project in the summer of 2013, Clive signed up two MOOCs running almost concurrently. Both were on the Coursera platform and both – coincidentally – from Wesleyan University. *Modernism and Postmodernism* was 14 weeks long and **Social Psychology** a more normal six weeks in length. Both courses chosen as they were based around an hour or so of weekly video lectures but despite being out of the same stable, they turned out to be very different in how video was used.

Modernism and Postmodernism was perhaps most 'conventional'. Each week there were four to six short video lectures and a couple of original texts as assigned readings. That was it. The videos featured Wesleyan president and star lecturer Prof Michael Roth. Most were professionally shot, though sometimes interspersed with lecture capture type clips from some of his classes. What was unexpected here was the quality of the video – although nice – was largely immaterial. The power and engagement was simply in Prof Roth's remarkable narrative, essentially the story of modern Western thought since the Enlightenment and expressed in the works of Kant, Rousseau, Marx, Darwin, Flaubert, Baudelaire, Woolf and so on, not really a 'grand narrative' but a compelling intellectual bricolage. I was genuinely gripped by the story Roth was telling, and sometimes just read the transcripts (much quicker) when I was too busy to watch the video.

Social Psychology used video differently. The video of the lecturer in was slightly more 'rough' but the editing was far more sophisticated. Great effort had been taken to get permission to show and edit in some remarkable clips of experiments (including the infamous Stanford Prison Experiment), TED talks, interviews with psychologists and some public broadcasting documentaries. This was supported by chapter-length PDF extracts from major textbooks and reprints of papers. Together this was an astonishingly rich learning resource, the best I have seen on any online course, including many paid-for ones. Like the other course, the tutor voice of Prof Scott Plous was very clear and engaging

In neither course did I especially follow the discussion threads, they were too fragmented. Social Psychology for example had 200,000 enrolments, 7000 forum posts in the first week and about 8000 students still active at the end. How can you have a 'conversation' in that environment? It made me wonder if 'interaction' our much-vaunted goal of many online courses is slightly overrated. Much more motivating to me as student was the strength of the narrative, the storyline, a bit like reading a good book in fact. Video proved an excellent way of getting that narrative across and the regular assignments in both made sure I assimilated at least some of the content and provided an important time frame to ensure I 'kept up'. This 'interaction light' approach seemed to be in contrast with the Open University courses I have done, and indeed tutor on. These are deliberately designed around a series of regular interactions with fellow students and tutors and, being written by a teaching team, have a far less imposing narrative personality. Maybe in the MOOC environment, where 'classical' online interaction is necessarily weaker, design may necessarily focus not simply on interaction but engagement and that strong personal narrative may often be a key element. Video can provide this 'human touch' and may be as, if not more, important as 'conventional' interaction in these types of courses.

9. Lecture capture in action – OASE and beyond

The most significant European educational project prior to REC:all on lecture capture was the Netherlands/Belgium SURF-funded OASE project (www.weblectures.nl) investigating the use of lecture capture or as the project termed it 'web lectures'. Like REC:all the OASE project was focused on developing new applications of web lectures. This meant focusing on specific groups, such as dyslexic students, or exploring new ways of using the tools themselves. The project discovered that the more interaction designed into the different types of web lectures, the more effective they were to help students really understand the material. OASE created a multi-dimensional pedagogical model (Fig. 4), which has been integrated in the current REC:all project, where the types of different web lectures are related to learning goals.

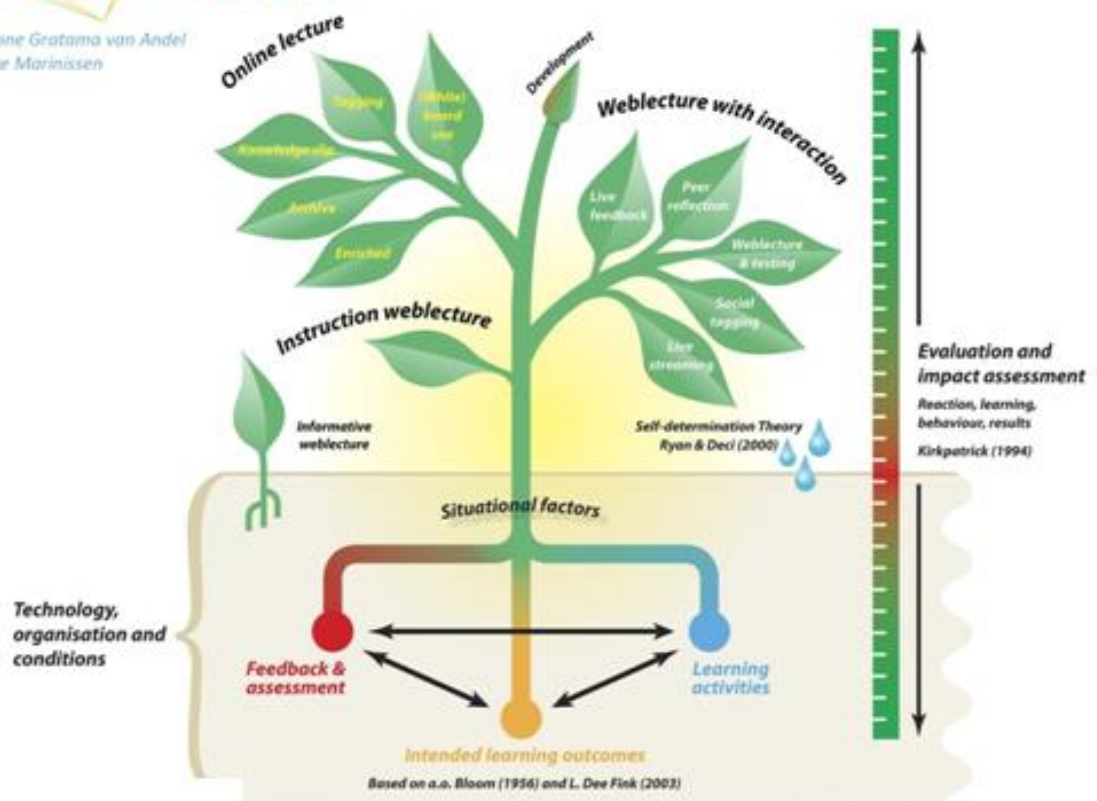


Fig 4 The OASE model

OASE attempted to build in a learning design perspective into a description of the various applications of lecture capture with notions of 'active learning', e.g. Fink (2004), at its core. Over two years, OASE piloted 22 case studies in ten higher education institutes representing different types of web lectures as visualized in the model on the previous page.

An important part of the project was to evaluate how students used the different types of web lectures. Two case studies from the OASE project at (VU University and University of Tilburg). showed that “Knowledge and instruction clips - enriched with quizzes, web tasks, etc” were linked to a an improvement in first year exam pass rates, 15% in one case (Marinissen and Gratma van Andel, 2012). In the next section we will characterise the various types of lecture recording that were initially identified by OASE and how they were redeveloped by the REC:all project.

10. Overview of the REC:all case studies

As we have seen, lecture capture emerged as notions of 'meaningful' learning with digital video has been evolving rapidly (see Karpinnen, 2005 for another overview). The original 3 Is/4 Is model unpacked increasing levels student activity based around video materials and the REC:all project applied that model to investigate more specifically the different learning opportunities of lecture capture technologies. REC:all was also strongly influenced by the Netherlands/Belgium SURF-funded OASE project which also explored the use of lecture capture or as the project termed it 'web lectures' immediately before REC:all. Like REC:all the OASE project was focused on developing new applications of web lectures and identified a wide range of variants of this

pedagogical approach. OASE also discovered that the more interaction designed into the different types of web lectures, the more effective they were to help students really understand the material. Two case studies from the OASE project at (VU University and University of Tilburg) showed that “Knowledge and instruction clips - enriched with quizzes, web tasks, etc” were linked to an improvement in first year exam pass rates, 15% in one case (Marinissen and Gratama van Andel, 2012). In this way OASE attempted to build in a learning design perspective into a description of the various applications of lecture capture with notions of 'active learning', e.g. Fink (2004), at its core. REC:all built on the OASE concept by using a case study approach to characterize different forms of learning design based on active learning. More specifically we were interested in how the affordances of lecture capture technology could enable more independent and deeper learning.

In REC:all 15 pilot studies have been developed. We give a brief overview of the different types of lecture capture recordings and video we have used in these pilot studies. These address a range of learning goals which can be considered from lower to higher order learning (Sealfon, 2012).

10.1 Knowledge clips

Format: Knowledge Clips are short film clips in which knowledge is given in a bundled informative and understandable manner. A knowledge clip should be attractive and intriguing. These information is given visually in video, sometimes supported by a (green) screen with additional information such as graphics, text and images.

Added value for students: Knowledge clips (Figure 1) are used to help students understand better (basic) theories and models, related to the learning goals of understanding/remembering. Students can access very rapidly to the right clips they want to use for their study. They do not have to search through long “classic” recorded lectures, because clips are enclosed directly in the learning environment or video portal by title/topic.

Added value for teachers and pedagogical uses:

Usually teachers are recording knowledge clips to provide outlines of theories, show instruction (hence the alternative name “instruction clips), or show how simulations works, etc. Knowledge clips also help “flip the classroom”. Teachers can thus use the clips, so that “students can learn lower order learning goals, like basic theories and skills, outside the classroom” (Sealfon, 2012). This gives the teacher space to interact more with students inside the classroom, so face-to-face time is used more efficiently. As an example of use students are told to watch a (series of) clips prior to a class, the teacher then start the class with a discussion/poll. The teacher thus gets feedback on what students actually understand and the classroom can be used

to explore the learning goals deeper or address misunderstandings, sometimes through group work and peer support. Technically, such short clips are flexible as they can be easily updated and exchanged.



Figure 5 Knowledge clip Universitat Politècnica de València

10.2 Enriched knowledge clips and discussion based media

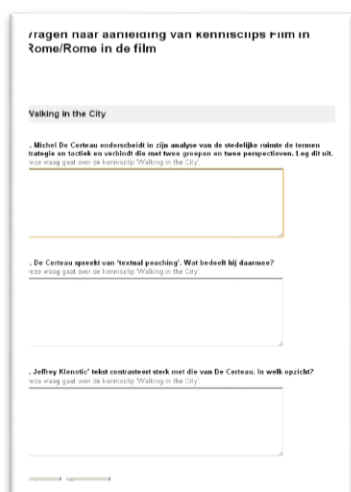


Fig. 6

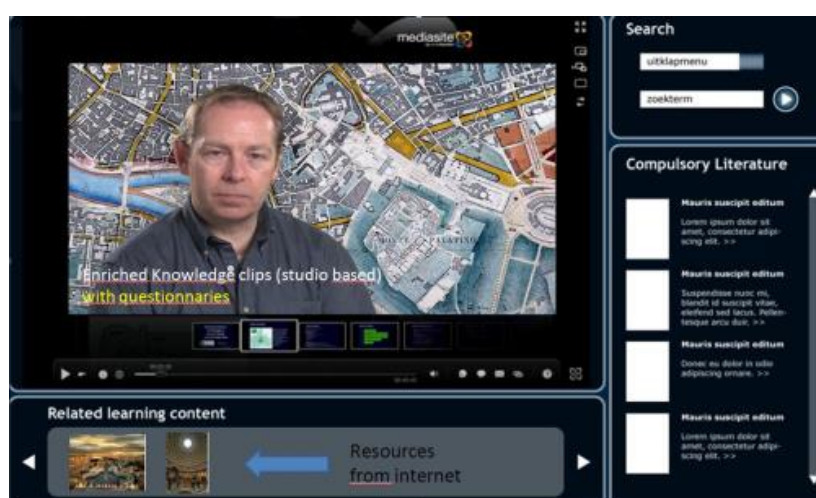


Fig. 7

Format: An enriched knowledge clip, is a knowledge clip that is enriched with additional information. This can be additional content related to the presentations but another form of enrichment is to add quizzes, polls, discussions etc.

Added value for students: Enriched knowledge clips are used when a teacher wants to pinpoint and explore different levels of content in the lecture, or maybe explore differing perspectives. Different types of content could have a strengthening effect on each other. Students watch the clip, and visit a website for more resources. The students do not have to switch from clip to content and vice versa, but now the information is integrated in one environment.

Added value for teachers: Studies within the OASE project showed that there was 20% more use of content if it's provided in this linked manner. Besides enriching content, teachers can also add quizzes to the clips, see the picture above. This is very easy via an environment as e.g. Google docs, or discussions around the clip with Google Forum. This gives the teacher and student's insight on what has been understood. Teachers can use an enriched clip with quizzes prior to classes, or as an instrument for informal or formative assessments.

Note that interactivity can occur there on different levels using enriched knowledge clips: on a level of content, individual and groups: Interaction arise at different levels. In one of the UCL case studies, the lecturer successfully linked "hot questions" related to his knowledge clips. Students added questions into a list system (in Moodle) and other students could vote on these questions. Questions with most votes, where "hot", and answered first by the teacher and this encouraged a high level of group interaction.

Deeper learning and engagement was also encouraged in two REC:all case studies at the VU University Amsterdam, within the faculty of Social Sciences (Statistics, 1200 students) and on at Tilburg University at the Economical Faculty (Accountancy, over 300 students). In both case studies knowledge clips where used to help students better understanding not only lower order learning goals, but also their skills. At the VU the functions of the statistics programme SPSS is explained, so students do not have to ask about this during face-to-face time. Here the teacher was using a simple, free online tool to record more than 72 clips, and published them on YouTube. At Tilburg basics of accountancy is explained, plus quizzes to test their knowledge. The teacher also showed best ways to work out calculations. Both approaches were found to work, and the pilot studies showed an increased pass rate of 15%.

10.3 Interactive feedback via live webinars

Format: A webinar is a short for web-based seminar, a presentation, lecture, workshop or seminar that is transmitted in real time over the web. The main feature of a webinar is its interactive elements -- the ability to give, receive and discuss information with an online audience.

Added value for students: Webinars are often used to help students achieve “higher order learning goals” (Sealfon, 2012). As Sealfon puts it “deeper learning happens when students are allowed and encouraged to make mistakes, provided there is timely and helpful feedback”. This is often what happens in the live element of flipped formats but this kind of feedback can be easily given via an interactive live webinar. A range of tools such as Mediasite, Presentations 2Go, etc. can provide this live interaction. There are many free tools available such as Skype, although these usually provide less functionality.

Added value for teachers: One of the REC:all case studies in is featured student teachers from the Faculty of Movement Sciences, VU University Amsterdam, and explored the pedagogical possibilities and added value of an interactive live webinar. The teacher used this to give the students themselves feedback on the lesson plans they had created. Students could ask questions, and sometimes have to work out tasks, during this interactive live webinar. The teacher found the integration of interactive live webinars improved the average quality of the learning products compared with the year before.

10.4 Student generated video materials

REC:all considers the highest form of learning occurs when students create content by themselves on a certain topic. If students have to show others how things work, or what a theory is about, they have to fully understand the matter. When students have to demonstrate skills, video is a better format than text based assessment, examples are teachers in front of class and lawyers in court. However video can also demonstrate mastery in a range of disciplines. One REC:all case study focused on film studies itself, and students had to show they understood the context of film location by creating new recordings at positions in the city of Amsterdam where famous movies have been shot. The sort of questions they explored was;

- What was the position of the camera?
- And how is this related with the choices the director of the film has made?
- What is the connection to different kind of theories, and why?

In the city students used mobile devices, to check data, to record films, and to present their findings. The films they created, had to be integrated in 'hotspots' in e.g. Google Maps, to make a connection with the location. Students had to attach a presentation to the hotspot about their findings. The films, the presentation at the hotspot in the city itself, plus their essays were products for their assessments. This type of integrated activity is very much aligned with “higher order learning goals”.

11. The REC:all model

The different types of recorded lectures and video that we identified through the 15 case studies and the related learning activities are quite complex. To give teachers and staff in HE an overview of the choices we have made over the course of the project, various a representations were developed to capture this complexity and to provide guidance to practitioners. The framework we describe below attempts to place the variants and combinations of lecture capture in a pedagogical framework not as a definitive taxonomy but as a way of identifying pedagogical components. The framework aims to help analyse the learning design, to identify various forms of innovation and to enable meaningful evaluation of the learning activities. This model aims to sketch out a pedagogical development process, and implies a left-to-right progression from fairly

simple use of 'raw' captured material towards increasing re-purposing, augmenting and the creation of bespoke 'knowledge clips'. These can be then integrated into online and blended learning in increasingly sophisticated ways, including 'flipping'. The x axis represents a progression from lower order learning goals to higher order learning goals (represented here by Bloom's familiar terminology) and the y axis greater levels of learner independence. The top row is more student-focused and the lower layer more teacher-focused. We found the various case studies could be characterized as falling into each of the six categories illustrate in the framework.

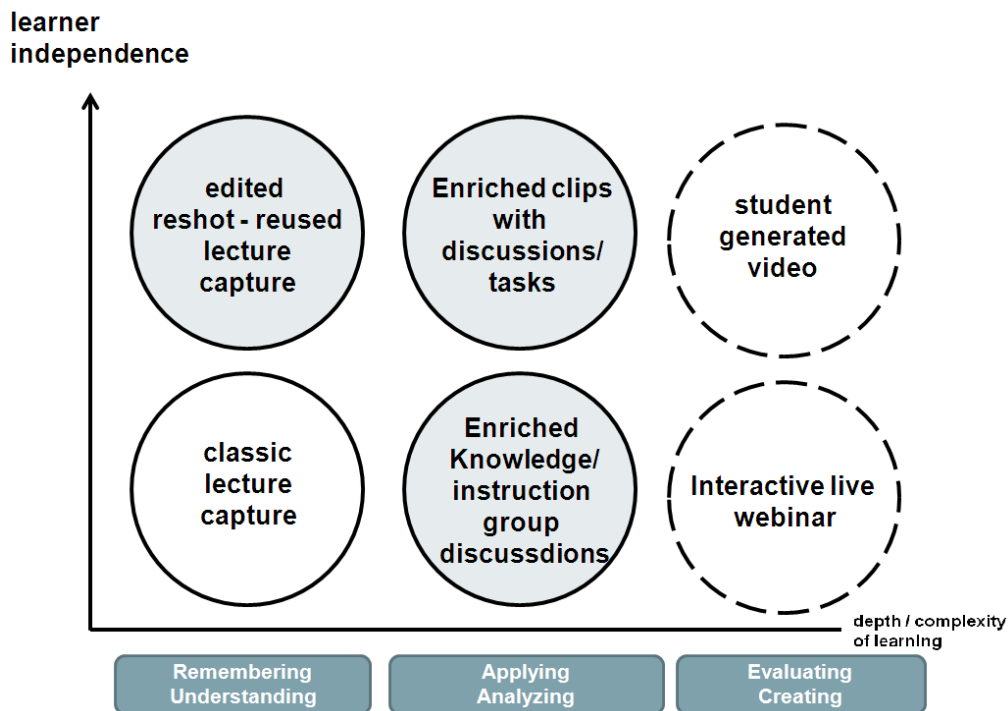


Figure 8: The REC:all framework

The framework can be seen as synthesizing the 3 Is framework but also addresses the learning processes of students (Fransen, J., Hogeschool InHolland) [A new work definition of blended learning, www.surfsharekit.nl {in Dutch}] The three levels of the framework, from lower to higher order learning are having a connection with:

1. learning from information and distribution (classic web lectures and knowledge clips)
2. learning from feedback and interacting (interactive use of enriched knowledge and instruction clips)
3. learning from different perspectives via collaboration (interacting with content via student generated video material and interactive live webinars).

In a sense the REC:all project has also identified a learning process for academics. Throughout our 15 case studies and in-depth discussions with practitioners in four institutions we found that as academics gained confidence about using technology they rapidly began to ask, "What can I do next?". This academic engagement is an important step in innovation in learning design and with so many of our participants taking this step quite naturally, we believe lecture capture has a genuine capacity for transformation at the individual and institutional level.

12. Conclusions

Lecture capture has already proved to be an extraordinarily popular technology will both students and staff. Although the use so far has been relatively conservative the potential pedagogic impact should not be underestimated. For the first time many academics are using video regularly to support teaching and learning and students are becoming accustomed to regarding the lecture itself as more a resource than an ephemeral event that can be revisited and engaged with. The superficially simple idea of providing access to lectures at the students own pace and location may lead to surprising innovation.

Institutions are beginning to build extensive libraries of recorded material. These are already being re-used for content-based marketing, raising the institutional profile by allowing external access to teaching and learning events, and providing a route to more flexible, distance and blended modes of learning,

The REC:all framework provides a route to analyse and evaluate this type of innovation and shows how educational value is being added, how this is influencing student engagement and learning and some of the implications for teaching styles. What is significant about the REC:all approach is that it links technology, practice and current pedagogical theory (e.g. Sealfon, 2012).

It may not seem immediately obvious but we believe lecture capture is now facilitating a subtle realignment of learning designs away from the broadcast-style lecture towards a more interactive approach, with live events providing better interaction and engagement with the subject expert and the student body. These are early days but as academic become more confident using the technology increases, student demand increases and the systems themselves become more focused on student interaction and feedback, we are confident this lecture capture will have an increasing impact on teaching and learning.

13. Résumé

« Le terme captation de cours est réducteur et reflète mal l'incroyable potentiel de cet outil. »

(Russell, 2012)

Le présent rapport est le fruit du projet REC:all (2011-2013), soutenu par la Commission Européenne dans le cadre du Programme pour l'éducation et la formation tout au long de la vie, qui vise à dépasser une vision passive de la captation de cours.

De nombreuses universités filment leurs cours et les mettent en ligne afin de les rendre plus accessibles aux étudiants. En général, ces enregistrements sont présentés dans un format linéaire traditionnel qui n'implique *a priori* aucune innovation pédagogique. C'est ce que nous tentons de remettre en question dans ce rapport en explorant toutes les innovations qui incitent d'ores et déjà à parler de « captation de cours 2.0 ». Les systèmes de captation évoluent rapidement : ils permettent d'intégrer les cours aux réseaux sociaux et de générer des vidéos de référence sur mesure pour faire le point sur les connaissances. On remarque d'ailleurs que de plus en plus d'étudiants s'approprient les systèmes institutionnels pour créer leurs propres clips, destinés aussi bien aux apprentissages qu'à leur évaluation.

Ainsi, la captation de cours s'impose peu à peu comme une technologie institutionnelle essentielle permettant de générer des ressources dans un contexte virtuel et/ou présentiel. REC:all étudie toutes les pistes qui rendent la captation de cours plus attractive d'un point de vue pédagogique ; le projet se penche aussi bien sur les questions d'ingénierie pédagogique que sur les aspects techniques et juridiques.

De même, REC:all fournit les lignes directrices pour analyser les pratiques innovantes et évaluer leur valeur ajoutée en terme d'apprentissage et d'implication pour les étudiants, et en terme d'évolution des pratiques pédagogiques des professeurs. L'intérêt de la démarche REC:all est de faire le lien entre la technologie, les pratiques de cours et les théories pédagogiques actuelles.

Les conclusions du projet nous confortent dans notre conviction que la captation de cours est une source de réflexion pédagogique sans précédent. De plus, les études de cas nous montrent qu'elle permet de sensibiliser les enseignants aux atouts de la vidéo et des autres médias pour améliorer les cours et leur assimilation par les étudiants. Bien souvent, la captation de cours "classique" n'est que la première étape vers des formes plus innovantes et participatives, comme "le cours inversé" ou la création de vidéos par les étudiants.

Il ne s'agit encore que des prémisses, mais nous pensons que la captation de cours est un vecteur d'évolution des modèles d'apprentissage depuis le modèle "magistral" vers un modèle plus participatif, fondé sur les interactions entre le corps enseignant et les étudiants. Avec l'appropriation croissante des avancées technologiques par les professeurs, la forte demande des étudiants et l'avènement de systèmes plus participatifs et centrés sur l'apprenant, nul doute que l'usage de la captation de cours va continuer à se développer chez les élèves et les enseignants.

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