



Innovative pedagogies series: Video creation and reuse for learning in higher education

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Introduction

My motivation for this topic was two-fold. Firstly, I have been teaching on an MSc in Social Research Method for nearly 25 years, and this was based, to a large extent, on a resource-based model. Originally these were physical resources like texts, papers, and data sets. But with the Internet revolution, they included software, websites and discussion groups. As part of an Economic and Social Research Council (ESRC) funded project, colleagues and I developed a website (OnlineQDA)¹ with textual and interactive materials to support students and researchers' learning about qualitative research methods and the use of software for qualitative analysis.

The digital revolution has now meant that video creation and use is much more accessible and common. The technology of film/video is becoming ever cheaper and the process of post-production work is now something that can be achieved on desktop computers. So video production seemed to be the next step to take in resource creation. As part of a Higher Education Academy (HEA) funded project (REQUALLO)² we created a range of videos of researchers talking about how they had undertaken their qualitative analysis and these were added to the OnlineQDA website.

My second motivation was YouTube. By 2010 it was clear that putting videos online and watching videos online was becoming very popular. YouTube itself was successful enough to be purchased by Google and the site made the whole process of making videos openly available to students (and others) very easy. As part of the REQUALLO project I had already made videos of academic presentations and now I decided to record some of my own postgraduate-level lectures. I put these onto my new channel on YouTube³ and was immediately impressed at how many people were watching them. Having been accustomed to teaching a few tens of students each year as a lecturer, I was astounded that thousands were watching these videos on recondite areas of the Social Sciences. It was clear that students were looking for such instructional material and that it was meeting a learning need both in my own students and in postgraduates across the world.

I have now produced over 120 videos varying from five minutes to over an hour long on a range of topics in Social Science research methods. Most use a form of lecture capture but with considerable enhancements (see later discussion), but there are also some that take other formats (e.g. interviews with practitioners). They have all been released as Open Educational Resources (OERs) under a Creative Commons Licence⁴ and almost all are available on my YouTube channel.

Innovating in making videos for learning

Pedagogic context

There is a wide range of ways in which video can be used in teaching, and perhaps the most obvious is lecture capture⁵. Such videos can be used to provide a backup to traditional teaching approaches for students who miss the live session or who want to go back to revise and revisit sections of the session or they can be used in blended or distance learning contexts. Videos recorded in lectures automatically tend to be

¹ <http://onlineqda.hud.ac.uk/index.php>

² http://onlineqda.hud.ac.uk/_REQUALLO/Index.php

³ <https://www.youtube.com/channel/UCafkV40656nWz9Jc129ZCFA>

⁴ <http://creativecommons.org/licenses/>

⁵ https://www.youtube.com/watch?v=4SZDTp3_New

rather poor technical quality and are often not much better than a good audio recording. However, with some enhancements (discussed later) they can constitute a very valuable educational resource.

A variation on lecture capture is recording a talk⁶; presentation⁷; interview⁸; or discussion⁹ specifically to video. This can be done in traditional fashion using a camera to video the speaker, or by using screen-capture software to show text (e.g. the PowerPoint slides) or a range of images and effects¹⁰ that illustrate and reinforce the ideas being discussed.

Videos can be used in live teaching sessions too. For example, I use short videos on the use of statistics software¹¹ in lectures to illustrate how to carry out the statistical procedures I have just been explaining and before students go on to practice this in labs that follow immediately afterwards. A colleague uses a short video¹² in which she explains (with visual re-enforcing metaphors) the key conceptual terms used by sociologist Pierre Bourdieu. She finds that using this in a teaching session presents the concepts to student in such a way that they start to generalise the ideas they hear and take them up in later group discussion.

But there are many other ways video can be used. One approach, that is very common on YouTube, is videos demonstrating the use of software or the use of equipment – the how to do ... videos¹³. These can range from very simple, short videos on how to use the library system or how to use an e-portfolio, to much more complex ones looking at common errors in programming computer game writing systems.

Videos can be used to capture the kinds of advice and guidance we tend to give outside timetabled hours, often on a one-to-one basis. Typical uses here include short explanations of key terms, theoretical ideas and specific techniques. One example of this that a colleague has produced is a video demonstrating the thought process that one goes through in reading a new and challenging research paper¹⁴. This both illustrates the analytic process and demystifies the difficulties readers can encounter. Because of their informality, it is often acceptable to students to record these videos to a less professional standard, using, for instance, smart phones and no special microphones. These are the kind of videos that are suitable for a specific teaching context and are not the kind that it makes sense to share outside the particular class being taught.

Video can also be used to give feedback. It is now becoming more common to give audio feedback in marking student work. This seems to offer a sense of informality to students that makes critical comments seem less intimidating, but it is somewhat limited to a commentary about the assessment as a whole. Using video adds further affordances. In particular, the presentation of the text being talked about on screen alongside the commentary and the use of gestures (with the mouse or with pen or highlighter) mean that the student can see exactly what text is being referred to. This approach can be very useful for students with dyslexia where specific and detailed feedback is important. The same focusing of feedback can be achieved in other forms of student work, such as comments on computer coding in a game-creation system where specific errors can be identified in the video, corrected, and the effects on the game seen immediately.

A particularly powerful use of video that some academics are using is to get students to make the videos themselves (Alpay and Gulati 2010; Armstrong *et al.* 2012; Kemp *et al.* 2012). This does not have to be the students you are engaged with directly as a teacher although that is a possibility. Students can be asked to

⁶ <https://www.youtube.com/watch?v=F5rEy1lbvIw>

⁷ <https://www.youtube.com/watch?v=JLwtqQUCeNg>

⁸ <https://www.youtube.com/watch?v=D5AHmHQS6WQ>

⁹ <https://www.youtube.com/watch?v=jaxBy-KIfpg>

¹⁰ <https://www.youtube.com/watch?v=0tZ2mhsYrPU>

¹¹ https://www.youtube.com/watch?v=_KHI3ScO8sc

¹² https://youtu.be/1W_ikfGg2nU

¹³ <https://www.youtube.com/watch?v=nSM-WbzIWpw>

¹⁴ <https://www.youtube.com/watch?v=YkOwQ9AMlug>

produce a video about a key concept/method and the production of the video is a prompt to their learning and also can act as a way to assess their understanding. Media production students and drama students are often keen to make such videos.

My own practice in producing, filming and editing the videos has evolved over the last five years. I am self-taught in camera work and the use of non-linear editing (NLE) software (Final Cut Pro) as well as in general video design issues, though I have benefitted from material produced by Jisc¹⁵ and from YouTube 'how to' pages and videos¹⁶. An important catalyst has been the large number of YouTube viewers who have written telling me of their appreciation of my videos and the role they have played in their studies or teaching.

My first forays into video production, as part of the HEA funded REQUALLO project aimed to capture, in detail, how researchers undertook qualitative data analysis. We interviewed researchers about their analysis. At the time they were near completing PhD students and now they are mostly university lecturers. Some of these were videoed. I also recorded some lectures and talks, including some sessions from the 2010 NCRM Research Methods Festival at the University of Oxford¹⁷ and I videoed an interview with a colleague about his particular qualitative analysis technique (Template Analysis)¹⁸. These were all recorded in standard definition on a straightforward consumer camcorder. Initially I used Final Cut Express and then moved to Final Cut Pro to edit them and made them available by putting them on the OnlineQDA website¹⁹ along with other REQUALLO materials. This latter stage was not easy and involved technical support and a search for a suitable video player that could be incorporated into the website (we eventually decided on FlowPlayer). Soon after this I discovered YouTube and the ease with which videos could be uploaded and made available on the Internet. Using YouTube (or another video website, like Vimeo) brings two advantages. Firstly, it eliminates all the complex issues of running a website and sorting out and maintaining a local video player. You just upload the video and it is available to the world. It is possible to embed these videos into your own web pages (or VLE pages). This involves using a small piece of HTML code that is provided by YouTube and cutting and pasting it into your web page. Secondly, YouTube has a very good search engine and by using the metadata you provide when you upload a video it offers an excellent way in which students can find your videos. In this respect I have found YouTube the best site for my videos. I have put one of my most popular videos on several different websites and, overwhelmingly, YouTube has the most views. In my area of the Social Sciences at least, YouTube is where students and teachers go to find material.

I began recording my own lectures/presentations with those I was doing for several Masters modules on social research methods. Several were on 'grounded theory method' and they proved very popular on YouTube. One advantage of YouTube is that you can see very quickly how many people are viewing your video. Some of these videos on grounded theory have now notched up over 50,000 views. This is not in the same league as cats playing piano and Gangnam style dancing, but still large numbers for such an obscure topic. Eventually, I had a whole course's worth of sessions recorded and with a new camera and microphones more recent recordings were in high definition (HD). When I started in 2010, standard definition videos were the norm (though some people uploaded in even lower resolutions). Now HD is the norm and YouTube has just introduced a facility for uploading and playing in 4k or UHD – twice the linear resolution of HD.

¹⁵ <http://www.jiscdigitalmedia.ac.uk/infokit/video-creation/video-creation-home> and <http://www.jiscdigitalmedia.ac.uk/infokit/video-planning/video-planning-home>.

¹⁶ <https://support.google.com/youtube/?hl=en-GB#topic=4355266>

¹⁷ http://onlineqda.hud.ac.uk/movies/ESRC_RMF_2010/index.php#Part1

¹⁸ <https://www.youtube.com/playlist?list=PL2EF5188800C558D0>

¹⁹ <http://onlineqda.hud.ac.uk/>

Evidence of impact

The impact of my videos can be examined in two ways: (i) viewing statistics; and (ii) how they are used by teachers and students in learning and teaching.

Probably the best way of acquiring viewing statistics is via website analytics and there are both Google Analytics for the OnlineQDA site (where my videos were first stored and some still are) and analytics from the YouTube Channel that now holds most of the videos. Figure 1 shows recent general statistics from the OnlineQDA site.

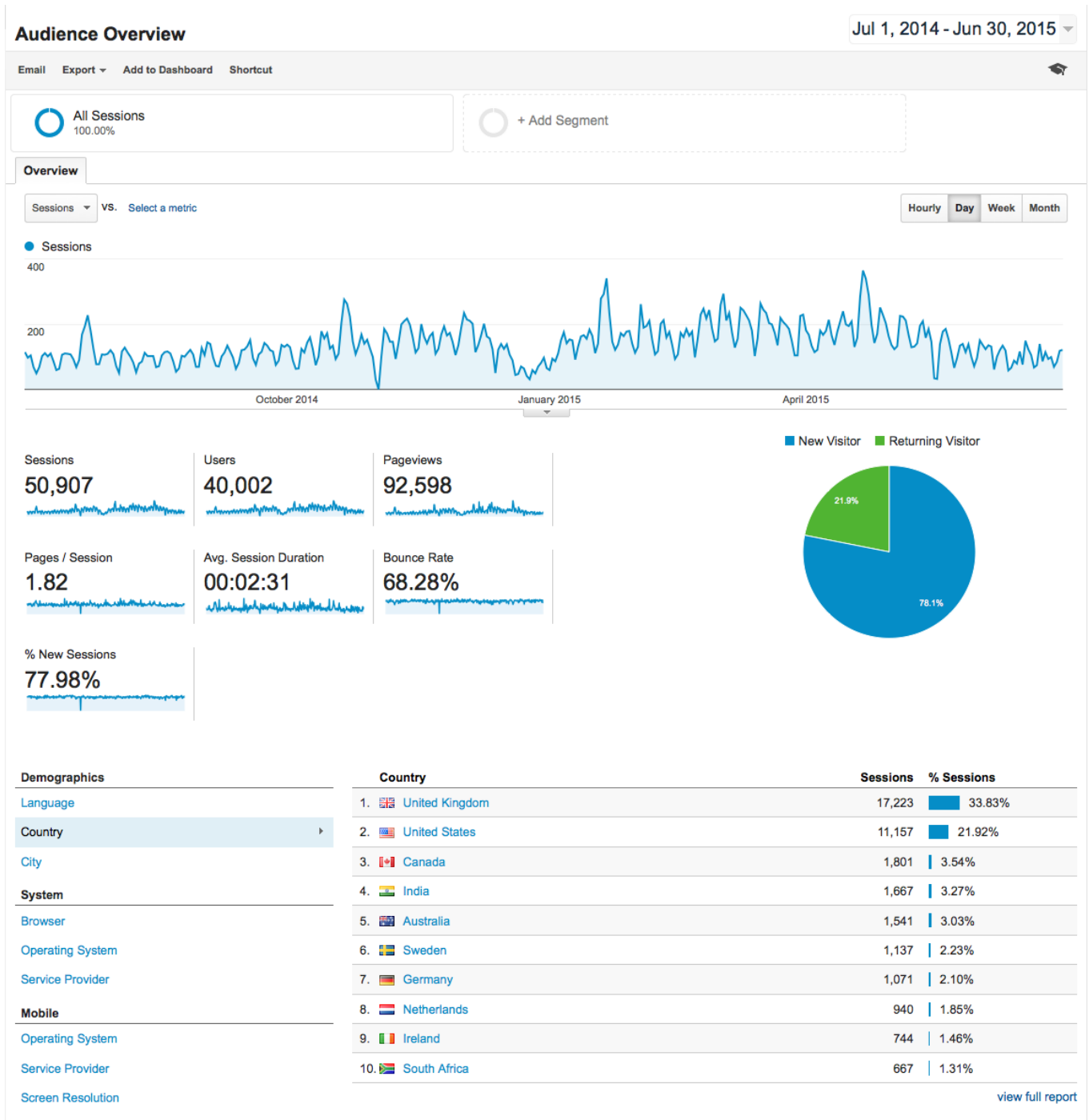


FIGURE 1: VISITORS OVERVIEW FOR THE ONLINEQDA.HUD.AC.UK WEBSITE (1 JULY 14–30 JUNE 15).

Visits to the website vary around an average of about 140 per day and visitors inspect an average of around two pages. As is common on such websites, a high proportion of these visitors bounce directly away from the website. However, around a quarter are returning visitors.

Page usage shows that the text pages on OnlineQDA remain very popular and, although less often used, the figures suggest that the video material is being watched. The average duration of a visit is just three minutes and four seconds over all users (and most do not stay). However, of those who visit pages with video, the duration times are much longer (four, five, or six minutes, on average) and clearly indicate that visitors are watching the videos. Videos are receiving around 30 to 40 visits per month.

Analytics from YouTube for the video materials on my channel give much more focused data on individual videos. The channel has now been running for about five years and the videos in it have had a total of around 1 million views. There are over 5,500 subscribers to the channel. The most popular videos receive between 4,000 and 11,000 views per year.

Data on individual videos suggests that they are commonly viewed to their end. Retention rates tend to be higher than average for videos of similar length. There have been over 700 comments on the videos and these are usually thankful for the resource. Where the information is given, most of these comments are from researchers or research students who need to learn about aspects of social research methods.

Here are some typical comments left in YouTube or emailed to me.

Mar 2012

[Name withheld]

Thank you for sharing all the videos related to research methods on YouTube.

I have learned a lot from watching them and also think that this is a good media for self-learning.

I am a surgeon from Taiwan and doing a PhD related to surgical education in [UK University].

Using a qualitative approach is a new and big challenge for me. Your effort makes my life easier.

Thank you so much!

Best Wishes,

[Name withheld]

Department of Medical Education

Department of Surgery

[University Hospital in Taiwan]

15 Apr 2014

[Name withheld]

"Fantastic Lecture! I utilised it for my research methods class in Clinical Psychology. It was clear, concise and understandable. Wish you lectured at my university!"

29 Jun 2015

[Name withheld]

I have spent £10,000 on an MSc in Psychology and I have learnt more from videos like this compared to the lectures provided by my Uni. Thanks Doc!

How students and teachers use the videos is much harder to establish. In 2014, I undertook an online survey to investigate this, but the response was disappointingly small. However, it did confirm the picture of usage that can be gleaned from the YouTube comments and emails from viewers. In line with other research on video use (Kay 2012), I found that viewers watched selectively. They watched more than once, or paused and played back when needed, and some took notes while viewing. Teachers using the videos said, in about equal numbers, that they used the video in teaching sessions, used it as supplemental materials, or just as extra material. A few made the video compulsory. But very few modified the videos; almost all just showed the whole thing. Overwhelmingly, they chose the videos because of their relevance rather than on the basis of who made them or the university they came from.

Use in MSc Social Research and Evaluation (Distance Learning)

With the success of the videos on YouTube in mind, in 2013 I proposed a distance-learning version of the MSc from which many of the videos had come. This was validated and recruited its first cohort in Sept 2014. The course is delivered entirely online and is based on the flipped classroom concept where students are given preparatory work to do before online webinars. The videos I have made, and others made by colleagues following this model, are key components of the resources that students use before webinars. These are complemented by other videos chosen from YouTube along with selected readings and some collaborative tasks. The course will celebrate its first graduates in August 2015.

Learning theory and video production, use and re-use

There is now much evidence that students get more from videos than just the transfer of knowledge. The video image itself can be important, conveying a whole host of additional features. For example, these can include the enthusiasm of the lecturer, pacing of the material considered and explanations that tackle especially difficult aspects of the topic. Videos may also give an accurate portrayal of real-life situations (when going beyond lecture capture) and a sense of the embeddedness and holistic nature of learning in real situations (Davis *et al.* 2009). Moreover, students are not just passive receivers of video content. They use videos in interactive ways. They stop, and start, and replay videos to extract a full understanding from them and they can access the video in a wide range of circumstances and at various times (Hampe 1999; Kay 2012).

However, in some cases, learners can do all the right things with a video (or other learning materials) but still fail to learn accurately the material at hand. One reason for this is that learners rarely start with no understanding of a situation or topic, but rather commonly have some, albeit inaccurate or limited, conception of the material, and they use this to understand and explain the phenomena they are learning about without realising its inaccuracy. There is now a body of research on this mistaken theory of learning that has found the error occurs in a range of scientific and mathematical disciplines. Students might think they understand a lecture, video, or textbook, but when questioned closely they reveal inaccurate explanations or theories about the phenomena (Smith *et al.* 1993; Chi *et al.* 1994; Vosniadou 1994; Duit and Treagust 2003; diSessa 2006).

Some of this research examines the use of videos explicitly and suggests that they may often fail to challenge learners' mistaken ideas and, in fact, actually reinforce them (Yeo *et al.* 2004; Muller *et al.* 2008). Yeo *et al.* (2004) showed that in using virtual experiments, students interacted superficially, retained their original misconceptions and need subsequent tutor intervention as a kind of scaffolding to ensure they focused on the salient conceptual issues. Muller *et al.* demonstrated that by tackling the misconception explicitly in video-based, multimedia material this scaffolding could be incorporated into the video itself. Muller *et al.*'s work suggests that when using video, simply presenting the correct explanation to learners often fails to improve understanding. However, my own work suggests that, in other disciplines at least, this is not always true. Muller argues that it is only when misconceptions are explicitly addressed in the video that learning gains can be demonstrated. Muller does this in videos by having a participant who offers the incorrect conceptions, which are corrected later in the video.

There is a literature on good practice in the creation of multimedia materials in teaching and learning (e.g. Kuomi 2006). As far as possible, my video productions follow the guidelines suggested by the work of Mayer and colleagues (Mayer 2009; Clark and Mayer 2008). These include first, principles to reduce extraneous processing. So, if feasible, extraneous text is omitted, visual cues on screen are linked directly with the point being made and relevant commentary and images are kept together. Second, principles to manage essential processing are followed. Thus the videos break up learning into clear segments and viewers are encouraged to pause and re-watch sections and, at the start, the videos establish the major conceptual issues involved. In some cases segmentation is achieved by creating separate, short videos. In other cases the slides used give strong indications of topic change and provide essential scaffolding for the viewer. Third, principles to foster generative processing were followed. A key issue here is that learning is better when images and words are

combined. This is done in a variety of ways such as by the use of the concrete example of interviews or by the use of animated graphs and diagrams. The speaker's images is either not used or omitted when graphs and diagrams are the focus of the conceptual message.

Open educational resources

An important motivation has been my desire, as a National Teaching Fellow (NTF), and with a long career in teaching, to put something back into the community of learners. Creating the videos has been an important way in which I can put to use my teaching skills, address a larger audience and engage with the public. Open educational resources (OERs) may be put into the public domain, which means anyone can use them in any way they like without attribution. But most OERs are now released with a Creative Commons²⁰ (CC) licence. There are several different versions of CC licence. All licence types require the recognition of the work's author when used (CC-BY). In this sense the work is not in the public domain. In addition, the CC licence version that I use restricts re-use to non-commercial users (NC) and requires anything produced using my videos to be released under the same licence, called share-alike (SA).

There is mixed evidence of the take up and use of OER materials. Petrides (2008) found that teachers in education often looked for such material, but were less likely to create and deposit materials for others to use. 92% searched for open educational resources but only 67% were willing to deposit and only 25% actually did so. In a study of health staff, Rolfe (2012) found teachers reluctant to put material they had created on the open web, but they did share material internally among close colleagues. In a survey of teachers of research methods in UK institutions, I found that video use was very common (see Table 1). In the same survey, I found that the most common source of third-party resources that research methods teachers were using was YouTube (see Table 2).

Table 1: Materials/media used in teaching by research methods teachers	
Material/media	%
PowerPoint slides	100
Recommended texts	98
Reading lists	86
Prepared lecture notes	85
Required reading	73
Film/video/animation	72
Case studies/role plays	64
Tutorial/problem sheets	63
Worked examples sheets	48
In-class quizzes/tests	45
Artefacts (as products, models, drawings/designs)	23
Computer-aided learning software/learning technology	21
Task specific software	12
Other ICT	11

²⁰ <http://creativecommons.org/>

Table 2: Where third party resources used by research methods teachers have come from

Resource	%
YouTube	50
Your Libraries' digital resources (such as e-Books):	44
Other courses on your institution's VLE (such as Blackboard):	32
Professional body website	24
HEA website	19
Discipline specific website (such as OnlineQDA.hud.ac.uk):	16
Corporate website	14
Another Institution's website/VLE	11
National educational repository (such as JORUM):	8
Open access repository (such as OpenLearn):	8
iTunesU	8
Box of Broadcasts	8
Flickr	4
Other (incl. own developed resources):	3
BUFVC	1
MOOC/OpenCourseWare (e.g. edShare):	0

An issue that has to be addressed by those thinking of creating open educational videos is where to deposit them so others may use them. One factor here is sustainability. In a survey of repositories for OERs, Freisen (2009) found that they tend to have a short lifespan. Eleven repositories were discontinued in the first decade of the 21st century, and only two were over five years old. The UK higher education repository, Jorum, which has been operating for 12 years, will now join the group of discontinued repositories. However, Jisc, which had funded the repository, is investigating ways in which the resources and their dissemination can be continued in other ways. Fortunately, in the case of video materials, there is YouTube, which has proved immensely popular. The danger to academics using YouTube to publish their work is not closure, but commercial pressure. At the moment it is possible to deposit videos without cost and without needing to associate with or show any advertising. Google, the owners of YouTube, are now making attempts to monetise the site much more, and some of the more popular channels are being forced to monetise by advertising. I think it is unlikely YouTube will extend this to all depositors as they would risk alienating a very large number of people. But it might affect large institutions setting up YouTube channels – as many universities have done.

Making your own videos

I am fascinated by video production and do most of the required production work myself, from writing, through filming, to publishing for Internet use. But the key issue here is that as teachers you do not have to do it all. There are a number of steps in the workflow:

- 1. Write** (scripts, lecture, etc.): this is usually the job of the academic, but it could be someone else's session you are recording, and it might be useful to liaise with your technology support staff to discuss graphics and other enhancements that you might use.
- 2. Perform** (do the teaching/give the lecture): again, this is down to you the academic to do, but collaboration is a good idea, for example, to video discussions or interviews.

3. **Record** (e.g. on camera): in the simple case (e.g. a short feedback video), it is easy to do on your own, but for more complex sessions, assistance on cameras and sound can be very useful.
4. **Edit** (including any enhancements of content): in many cases, technical support here can be crucial. But again, for simple screen recordings you can easily do it all yourself.
5. **Publish/disseminate**: while it is not hard to upload a video to YouTube, a collaboration of academic and technical input is useful here.

The key is to find a workflow alongside technical specialists (or helpful colleagues) so that teachers and technical experts work together and each gets help at any stage where it is needed. I have worked with colleagues and technical experts on this basis to produce videos for our distance-learning masters.

The gear needed for video production

Most of the time you cannot make a video without a camera. Fortunately these are becoming considerably cheaper, better quality, and much easier to use. A basic consumer camcorder is probably the cheapest and easiest to use. Most new models now record high definition (HD) and record to memory cards (mostly secure digital SDXC cards). They come with a range of built-in features that mean you can use them on automatic and they will adjust focus, aperture, white balance, etc. as needed.

Another option is to use a digital SLR camera, most of which now record HD video too. Although this will enable you to record very good quality images, there are some disadvantages to DSLR cameras. First, they can only record a scene continuously for a short time. Second, they usually have very poor microphones and limited ability to use external microphones. Sound quality is probably the most important issue in educational videos, so if you are going to use a DSLR then you will need to think about other ways of recording sound (see below).

You can of course also use a smart phone or a tablet computer to record video. Again, most now will record HD video but quality and sound are not as good. These are great for short takes, but if you want to use one for longer recording you will need to have some way of mounting the phone (etc.) on a tripod and ensure there is enough internal storage available. And don't forget to hold or mount it in landscape position! Expensive, 'professional' video cameras produce very good quality pictures and sound – and most will have automatic mode too – but they typically cost over £1,000. To get the best out of the camera you or your cameraperson will need to know how to use it on manual. Most cameras can be mounted on a tripod and this is an important piece of gear for longer takes or for situations where manpower is limited (e.g. if you video yourself).

There are, however, situations and approaches where you do not need a camera. One of these is where the main topic is what is happening on a computer screen. This is often the case when demonstrating how to use software or access websites, but can include very simple slide displays or presentations with voice over. In this case you will need screen recording software such as Camtasia or Adobe Captivate. It is a good idea to use a good quality microphone to record the voice over. There are a number of high quality USB condenser microphones available that will work directly with the computer you are using. There is now also a range of software for creating moving images, 3D simulations, and animations. Unfortunately, these take quite a bit of effort to learn, but it may be that you have access to technical support staff that have these skills.

A third possibility for sourcing your video is to use an app on your tablet. Examples here are Explain Everything, Adobe Voice, Video Scribe and Educreations. These apps record what is happening on your screen along with your voice and you can include pre-prepared images and screen annotations.

It is important here to match the quality of what you are doing with the gear and its technical quality. If you want to produce short, quick, immediate feedback to your own students with only limited circulation then a smart phone video recording or a tablet app will probably be fine. The visual quality may be limited, you will have limited ability (or no opportunity) to edit what you have recorded and the audio quality may not be top quality, but it will be good enough for purpose. On the other hand, you want to produce something that you

intend to use for several years, and share with others, perhaps as an OER, then a good quality camera, good sound equipment and good editing effort are worth spending time and money on.

In all cases, except perhaps the phone video and tablet apps, you will also need a computer to store the video files, and in many cases additional software to edit it. Especially if you are using HD, video files tend to be very large and you will need terabytes of hard disk or solid state storage. (It's a good idea to keep backups too!)

Lighting

In most cases, I have found that the lighting in standard teaching rooms (with strip lighting and daylight from the windows) is good enough for most educational video recording. But there are some circumstances to watch out for. One issue is bright sunlight coming in through the window. If you cannot use a room with north-facing windows then it may be best to close the curtains or shades and use the room lights only. A second issue is backlighting. This is either where someone is backlit by the window and appears in shadow (in which case move around them to avoid this) or, if you are recording a lecture, it is backlighting caused by the digital projector screen which is shining from behind the speaker and can be particularly problematic if the room has poor general lighting and no windows. This second case is very hard to deal with. Try to get as much light on the speaker as possible (without making the screen impossible to read for the audience), for example, by opening curtains or blinds. On some more capable video cameras there is a facility to over-expose the image so that the speaker is better lit at the expense of an over-exposed screen. This can also be achieved (with some loss of quality) in post-production editing. The speaker may then be properly lit, but the screen may be unreadable. I deal with that by adding in images of the slides in post-production editing.

Of course if you have access to lighting units then use them. But traditional video lighting is very hot and uses a lot of power (it might overload domestic supplies and extension cables). But the new systems based on LEDs, which are rapidly coming down in price, are low powered, and produce almost no heat. Use these if you have access to them. You will find some excellent online tutorials on how to use three-point lighting for video and camera work.

Sound

As I said above, probably the most important aspect of educational videos is the sound. Overwhelmingly, we are trying to explain something to the viewers and it is the voice that matters. Over the years, I have made most of the common errors in sound recording. One key issue when recording in large classrooms is room echo. This can make voice recordings very hard to follow, and I have had hard of hearing students complain about recordings with lots of room echo.

In most classroom situations the camera is placed some way from the speaker and both the built-in microphone and a camera-mounted shotgun microphone will pick up lots of distorting room echo. The easiest way round this is for the speaker to wear a lavalier or lapel microphone. The disadvantage is that you need to connect the microphone with the camera in some way.

There are three approaches here. First, use a cable. For several years I used a pair of cheap lapel microphones with a 12-foot unshielded cable on each with a Y connector to plug both directly into the single mini-jack socket on the camera. This is great for simple interviews where both speakers are fairly static. When giving lectures, though, where you might tend to move around a lot, you need to learn not to wander too far. You also need to remember the cable is unshielded so make sure it is not looped on itself or picking up other interference and this can produce a very loud hum or buzz on the recording. I now use more expensive microphones with XLR balanced cables that are not prone to picking up interference and these can have longer cables. This makes me more mobile, but the camera needs to have XLR inputs (or you will need an add-on box that gives you these inputs).

The second option is to use radio microphones. In this case the lapel microphone plugs into a small radio device that the speaker puts in their pocket or clips onto their belt. There is a radio receiver attached to the

camera. These systems are widely used and although they have a limited range, this is usually enough for work in teaching rooms. They are, however, rather expensive (on top of the microphones and the camera). But many universities may have sets you can borrow. If you do use radio microphones then make sure the batteries are fully charged, especially if you are doing a long recording.

The third possibility is rather like radio microphones but without the radio. It uses the wide availability of digital sound recorders. Dedicated sound recorders can be quite small, are battery operated and record onto digital cards. Plug your lapel microphone into the recorder, set it recording, and treat it like a radio microphone, so put it in the speaker's pocket or attach it to their belt. The speaker is completely free to move where they want. However, you now have a recording separate from the video. Fortunately it is a very simple matter to synchronise this with the video recording in post-production (keep the sound recording from the camera's internal microphone to do this). Some video editing programs even have a function for synchronising separate audio recordings with the video. The latest development in this approach is to use your smart phone as the recording device, so if you have one with a fair amount of memory available for recording, then you do not need to buy a recorder. But, beware; you may need to purchase a converter connector to plug your lapel microphone into the smart phone.

As I mentioned above, if you are recording directly to computer (e.g. screen recording) then the best choice is a USB condenser microphone. Condenser microphones are studio quality microphones and you need to be very near to the microphone to record properly, so for most teaching situations they are of no use. However, they are very good quality and the USB connector means they just plug into the computer and can be selected in software as the input device. Alternatively you could use your lapel microphone if it has a mini-jack plug and your computer has a microphone input socket. If your lapel microphone is XLR then you will need an additional amplifier to connect by USB to the computer.

Post-production

This refers to all the work done after the video has been recorded or created. For work with recordings from a video camera the essential item here is a non-linear editor (NLE). The most commonly used are Final Cut Pro, Premiere, iMovie, Sony Vegas, Pinnacle Studio, and Corel Video Studio Pro. This is what you need to get the recording off the camera, edit it, and then encode it for use on the Internet or intranet or on DVD/Blu-ray.

NLEs are very powerful programmes and enable you to transform the camera recording into a powerful educational video by combining video material, static and moving images, annotations, credits, audio, sound effects, and so on. They are not easy to learn to use, but fortunately if you want to learn (or need to) there are some very good video tutorials on YouTube and Vimeo and, if your university subscribes to Lynda, there are some good tutorials on Final Cut Pro and Premiere available there. However, this might be one area where you call in technical support. In my school our technical support team regularly employs placement students many of whom are taking film production courses and have the skills in using NLEs.

In some cases you may not need NLE software. If you are doing screen recording with Camtasia or Captivate then they come with their own integrated editing functions. In the case of some of the tablet/smart phone apps they have limited editing or none at all and the assumption is that you do the recording in one take with mistakes and all. So in these cases it is worth rehearsing beforehand.

Personnel needed for production

In many cases I have made my videos on my own. I can record my own lectures by setting up the camera on a tripod before the session and using a digital recorder in my pocket with a lapel microphone. With a bit of practice this is not hard to do. But having someone to help is much better. Having someone on camera is a good idea because if the speaker moves the camera can be panned to follow. I have done this when recording others' presentations and lectures. Unless you are using very complex professional sound equipment you probably will not need someone to work on sound. You can do that yourself. But if you are

working in rooms with professional sound systems then it might be useful to have technical support to help you connect your camera or recorder to the sound or PA system being used.

Production approaches

A lot of the material I have produced is what is usually referred to as lecture capture. However, I go to some effort to ensure that the quality of the video is good both by ensuring good production quality and by a lot of work in post-production. Consequently, the learning resource is much better than can be produced by most university automatic lecture capture systems.

There are various ways a lecture or talk can be recorded. It can be a live lecture. In that case there will be only one take (although you can edit out embarrassing interruptions, etc. during post-production). On the other hand, this gives a liveliness and engagement to the session that is hard to capture without an audience present. You may even have some class interaction that you can include in the video.

The second option is to present the material as a talk, just talking to camera without an audience present. This feels a bit odd the first time you do it – as academics we are used to having an audience/class that gives us some feedback. But you will soon get used to it. I find that pretending I am talking to a class or to one or two students helps. One advantage here is that if things go wrong, or you stumble over your words, you can easily do a retake and edit out the mistakes in post-production. For longer talks some kind of preparation (e.g. a PowerPoint file) as one might do for a lecture, is advisable. The slides can be projected on a screen (as in a live lecture) or appear on a TV screen beside the speaker or simply used as a paper-based or tablet based prompt. In the last case, you can add the slides back in in post-production. For short pieces you might just talk to camera and retake the whole thing if it's not good enough.

A classic form of talking to camera is the interview and this can be just a conversation between two seated speakers or it can be questioning about some practical aspects of learning such as demonstrating the use of research equipment. In these situations it is probably useful to have assistance (especially if you are the interviewer). There are different ways of doing interviews and if you have pre-planned questions that you stick to strictly then you may need only one camera (record the interviewer asking the questions again after the interview and edit these into the appropriate place in post-production). On the other hand this is a situation where it may make sense to have a second camera so you can film the interviewer and the interviewee at the same time. This gives you much more flexibility in how you run the interview and you can edit the material and even re-order content in post-production.

Another variation of the simple talk is the use of a green screen. This is literally a green screen that you sit in front of when filming. In post-production the green background is removed and replaced by anything you like. This is a common way of including slides or other images into the video and it is an easy matter to move the speaker over to one side to make room on the screen for the required text and images.

Interviews and talks are much easier to set up and record to a high quality, not least because they can be done in smaller rooms with good lighting (natural and strip lighting) and without a strong room echo. I have done many such interviews in academic offices and found the space, sound and lighting all quite adequate. Just make sure you find a quiet room without traffic noise and corridor noise. In life, we do not notice this most of the time, but when it appears on a video recording it is immediately obvious.

Another possibility for recording a talk is to use a screen recorder such as Camtasia or Adobe Captivate. This can be used to record a live lecture without a camera (you just get the voice and the PowerPoint slides (or whatever was on the screen)). Actually the software does allow you to video the speaker too, using a webcam. But then the speaker has to sit still in front of the webcam (not possible if it's a live talk) and the quality of the image is often not good. What you show on screen may be just the PowerPoint slides in which case this is a cheap and easy way of capturing lectures and visiting speakers, but I have found that it needs a good speaker and a well-written talk to produce a good learning resource.

The most common use of screen recorders is to produce instructional videos on how to use software or other computer-based (or Internet-based) resources. Preparation and practice are important in this case (make sure you not only know what you are going to say, but also that you have all the other resources, data, etc. to hand that you will need in the talk). The software comes with the ability to edit the recording, so you can edit out mistakes or pauses and it also enables you to zoom in on parts of the screen (e.g. a dialog box for data entry) and to add call-outs such as arrows, highlights, circles and annotations, all of which can make it much easier to give a clear explanation.

Pedagogic enhancements

As I have mentioned above, lecture capture videos, interviews and discussions can be improved as educational resources by a range of enhancements added in during the post production, editing phase. However, it is important to be restrained in their use and to follow as far as possible Mayer's principles (discussed above) in combining media.

The major enhancement I make is to add in text in a variety of forms. Most often this is the PowerPoint slides that may not appear properly on the screen or may be overexposed owing to the backlighting issues alluded to earlier. These give a pace to the video and also emphasise the points being made or can be used to show examples being discussed or charts and diagrams. To give an appropriate academic tone to the videos I also include full citations to books and articles mentioned by the speaker (I also include this in the description with the YouTube video). Captions can also be used to indicate points of emphasis or simply to identify speakers if necessary.

When using charts and diagrams in live teaching we usually gesture to parts of the diagram we are talking about or to indicate key issues it is illustrating. This can be mimicked in editing by highlighting at appropriate times or by successively revealing or hiding parts of the image. It is also possible to use callouts such as arrows, circles (or ellipses) around elements or even text annotations, which make clear what is significant in the image or diagram. Another way of achieving this can be zooming in and out of the image to move from one part to another as the explanation progresses. If you use photographic images, a nice touch here is to use what are called Ken Burns effects, slow panning and zooming on the images.

In some cases it makes sense to recreate on the video what you might do if you were undertaking a live demonstration or playing a video to a class. Effects that can be used here include freezing the video to focus on some aspect of the image (perhaps using callouts to do this) or to add a voice-over commentary. Captions can also be used to add a commentary without freezing the video.

In some cases you may want to add images, sound effects or video just to illustrate the points being made. This can be useful but bear in mind Mayer's principles and the need to avoid overloading the learner with too many media or messages and bear in mind copyright issues (see below).

All of this takes time and effort (and technical skill) in post-production editing. Sometimes simple is best, especially if it gets the video made when it is needed. For example, a video of your hand writing out text and formulae might be as good as a high quality visual effect done in post-production. This handwriting style of presentation has proved very popular in the Khan Academy videos and there is some evidence that students like this more intimate and informal form of presentation. I suspect that a key issue here is that handwriting text or formulae controls the pace of presentation.

Copyright issues

If you used other people's images, sounds and music in your videos, then unless they have made it free to re-use, you will need to get their permission and possibly pay royalties to use these materials in your video. Fortunately, there is a large amount of these creations available that have been made freely available and which you will not have to pay for. Many people use a version of the Creative Commons (CC) licence and some versions are intended to allow the re-use of material in the educational, non-profit making field with

just the condition that the original creators of the material are given appropriate credit. If you use a CC licence too then (making sure you respect any share alike conditions) it is relatively easy to use material licenced this way.

In the case of photographic and other images, there are two main sources, Flickr²¹ and Wikimedia Commons²². To find images and photos with open licences it is easiest to use the facility in Google Images search to find only images with specified licences. Use the Advance Search option under Setting in Google Images²³.

The situation for music is a bit more complicated. There are more sources and they are of varying quality, variety and licencing. A good list of websites that have royalty free music can be found in the Creative Commons website²⁴. If you include unlicensed music, for example, copied from CDs or purchased MP3s then you risk being detected very quickly as a potential copyright infringer when you upload your video to YouTube. I have even been challenged when using out of copyright music from the 19th century. (I successfully repudiated the challenge.)

When you use material with the CC licence, make sure you keep to the terms of the licence (e.g. giving appropriate credit to the creator) and that you make clear in your video (or in the information that accompanies it) that this material is licenced under the CC licence.

Dissemination

The last step in creating videos is to make them available for viewers to watch. In the past this meant producing artefacts like films or DVDs and then distributing and marketing them. Now there are various online systems that make digital distribution very easy.

As I mentioned above, to begin with I embedded my videos in my own website. Because of the difficulties in doing this and because it is hard to ensure that your videos will be viewable on all kinds of devices, this is best avoided. There are three main alternatives: embed the video in your local virtual learning environment (VLE), load the video into your university's video showing system or load your video into one of the public video viewing systems like YouTube.

The first two options have the drawback that they are usually behind passwords; you need to be a student or staff at the university to access them. So if you want to make your video more widely available or to make it an OER then these are not good options. Of the public video viewing systems I have found, YouTube is by far the best for academic videos. The one exception to this is videos in the fields of the Creative Arts and especially Cinematography, where Vimeo is a good option. By using one of these systems, your potential audience is the whole world and the videos can be watched on any device: computer, tablet or smart phone. It is an easy matter to include links to the videos in your university VLE or even to embed the video using the embed code the site provides. Uploading videos to YouTube is very easy, especially if done from a university computer where the speed of the Internet is usually much greater than the normal, domestic broadband service. Completed, high definition and long videos can be rather large (2.49 GB for a 58 min. video) so a quick upload speed is useful. You can upload gigabyte-sized files from a Broadband account (I have done this) but it may tie up your computer for several hours, so do it overnight.

To upload to YouTube you will need to establish a channel. This is free and easy to do but you will probably need a Gmail account to do so. You may also find that for a while, or until you have verified your identity, you

²¹ <https://www.flickr.com/creativecommons/>

²² https://commons.wikimedia.org/wiki/Main_Page

²³ https://www.google.co.uk/advanced_image_search?hl=en-GB&fg=1

²⁴ <http://creativecommons.org/legalmusicforvideos>

are restricted to uploading short videos (i.e. less than 15 mins.). There are some excellent help pages on YouTube²⁵ and here you will find information about the various services available and advice about preferred formats for the videos you are uploading and which you need to follow when rendering (creating the final version of) your video. For example, on a Mac, H264, 30fps, AAC, HD if possible, is recommended and these are all options in your NLE. When uploading videos to YouTube there is some key information you need to provide. There include obvious things like a title for the video and what licence you want to use. You can use the standard YouTube licence or use the CC licence they offer. I would recommend using the YouTube licence even if you want to release your video under a CC licence and have labelled it so. This is because the CC licence version that YouTube uses is without any restrictions except attribution, and it is a recipe for unscrupulous people to copy your video and re-issue it under their own name without giving proper credit and meeting the share-alike conditions. (That has happened to me.)

Metadata

The title you give your video and the description you can enter along with the tags (key terms) you use are crucial metadata that you should take some care and time completing. There is an excellent search engine in YouTube and most viewers use this to find videos. So it is imperative, if your video is to be found and viewed, that you provide information that the search engine will use to find your video. The main information it uses is the title of the video, its creator (i.e. you), the description you provide and the tags you use. So make sure these are as complete and accurate as you can make them. If you are not sure what tags or terms to use, try putting some test terms into the search engine in YouTube, a pop-up menu of the most commonly used terms will appear. Use some of these (assuming they are appropriate) to maximise the findability of your video. I always put my university details in the video credits and in the YouTube description field as I think this gives viewers a good indication of the type of material in the video and, I hope, of its quality.

Other advantages of using YouTube include its great system of analytics that enable you to track the viewing of your videos (see the discussion of my channel above). Another 'advantage' of YouTube is that viewers can write comments and ask questions. At the start of my use of YouTube I was very concerned about this as I thought it was an opportunity for abuse and trolling. However, in five years I have experienced none of that. I get occasional spam messages, but the YouTube system usually picks these up automatically and flags them for me to approve or to delete. Along with the viewing figures, it is good to get the complements and news from users. Some ask questions (about the video topic) and it is up to you whether to answer these questions or to leave others to do so.

Conclusion

It is clear that I am an enthusiast and I have to admit I get a lot of enjoyment from making videos, and especially from the editing process. But I believe we are close to the situation where video-making as well as video-watching is ubiquitous. Video-making is becoming cheaper and a lot easier and our students are expecting us to use and produce rich media resources like video. I therefore think there is both the pressure and the means for academics to get involved in a lot more videos production.

Of course, there is a temptation to leave it all to the learning technology staff. I believe that all too often this will lead to poor quality videos produced automatically and in a kind of machine production line by automatic lecture capture systems. But with informed and enthusiastic input from academics and teachers and in collaboration with learning technology staff we can do much better and produce high quality and meaningful resources.

²⁵ <https://support.google.com/youtube/?hl=en-GB#topic=4355266>

My experience suggests that using systems like YouTube can disseminate our work and enhance our personal reputations and that of the universities we work for. It makes our work easily accessible to both our own students and other interested learners across the world. At the very least, it promotes our personal reputation for good quality teaching and research, and perhaps it does the same for higher education in the UK.

By making the videos open educational resources, perhaps with one of the Creative Commons licences, we make our work accessible and available to others. In this way, we can give something back to the community that has been funding our employers and supporting our careers for years.

References

- Alpay, E., and Gulati, S. (2010) Student-led podcasting for Engineering education. *European Journal of Engineering Education*, **35** (4) 415–27. doi:10.1080/03043797, 2010, 487557.
- Armstrong, G.R., Massad, V. J. and Tucker, J. M. (2009) Interviewing the experts: Student produced podcast [Internet]. *Journal of Information Technology Education: Innovations in Practice*, **8**, 79–90. Available from: <http://jite.org/documents/Vol8/JITEv8IIP079-090Armstrong333.pdf> [Accessed 22 November 2015].
- Chi, M.T.H., Slotta J.D. and De Leeuw, N. (1994) From things to processes: a theory of conceptual change for learning science concepts. *Learning and Instruction*, **4** (1) 27-43.
- Clark, R. C. and Mayer, R. E. (2008) *e-Learning and the science of instruction* (2nd Ed.). San Francisco: Pfeiffer.
- Davis, S.J., Connolly, A., Linfield, E. (2009) Lecture capture: Making the most of face-to-face learning [Internet]. *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, **4** (2) 4–13. Available from: <https://www.heacademy.ac.uk/lecture-capture-making-most-face-face-learning> [Accessed 22 November 2015].
- diSessa, A.A. (2006) A history of conceptual change research: threads and fault lines'. In: Sawyer, K. (ed.) *Cambridge Handbook of the Learning Sciences*. Cambridge: Cambridge University Press, pp. 265–82.
- Duit, R. and Treagust, D.F. (2003) Conceptual change: a powerful framework for improving science teaching and learning. *International Journal of Science Education*, **25** (6) 671–88.
- Hampe, B. (1999) Video literacy series: what video does well in education – and what it doesn't. *Syllabus Magazine: Video and Presentation Technologies*, **13** (1).
- Kay, R.H. (2012) Exploring the use of video podcasts in education: a comprehensive review of the literature. *Computers in Human Behavior*, **28** (3) 820–31. doi:10.1016/j.chb.2012.01.011.
- Kemp, J., Mellor, A., Kotter, R. and Oosthoek, J.W. (2012) Student-produced podcasts as an assessment tool: An example from geomorphology. *Journal of Geography in Higher Education*, **36** (1) 117–30.
- Kuomi, J. (2006) *Designing video and multimedia*. London: Routledge.
- Mayer, R.E. (2009) *Multi-media Learning*. 2nd Ed. Cambridge: Cambridge University Press.
- Muller, D.A., Bewes, J., Sharma, M.D. and Reimann, P. (2007) 'Saying the wrong thing': improving learning with multimedia by including misconceptions. *Journal of Computer Assisted Learning*, **24** (2) 144–55.
- Petrides, L., Nguyen, L., Jimes, C. and Karaglani, A. (2008) Open educational resources: inquiring into author use and reuse. *International Journal of Technology Enhanced Learning*, **1** (1/2) 98-117.
- Rolfe, V. (2012) Open educational resources: staff attitudes and awareness. *Research in Learning Technology*, 2012, 20: 14395. DOI: 10.3402/rlt.v20i0/14395.
- Smith, J.P., diSessa, A.A. and Roschelle, J. (1993) Misconceptions reconceived: a constructivist analysis of knowledge in transition. *The Journal of the Learning Sciences*, **3** (2) 115–63.

- Vosniadou S. (1994) Capturing and modeling the process of conceptual change. *Learning and Instruction*, **4** (1) 45–69.
- Yeo, S., Loss, R., Zadnik, M., Harrison, A. and Treagust, D.F. (2004) What do students really learn from interactive multimedia? A Physics case study. *American Journal of Physics*, **72**, 1351–58.

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