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Engaging teachers (and students) with media streaming technology: the case of Box of Broadcasts.

Abstract

Information and Communications Technology offers powerful Web 2.0 tools that can benefit learners with different learning preferences. The rise of video streaming, the increased proliferation of 'on demand' televisual media and new smart phone streaming opportunities have generated a range of web-based media that may usefully support teachers and learners in accommodating these varied learning styles. At the same time, media streaming technologies such as YouTube have distinct drawbacks for students, teachers and their institutions, particularly in relation to appropriate content and the ethical issues around the uploading of student materials to a public repository.

Two studies are reported. In Study 1, two case studies of how teachers engaged students with a media-streaming system called Box of Broadcasts (BoB) are discussed using principles of Design-Based Research. The result from the first case study indicated that BoB provided an improved efficiency for teachers who filmed students' presentations in a second language. The second case-study illustrated how the integration of BoB into their classroom teaching led a psychology teacher to think differently about students and the design and delivery of teaching and learning resources. In Study 2, the use of a qualitative semi-structured interview approach with eight teachers indicated that staff felt that BoB was beneficial in supporting pedagogic practice. Furthermore, staff highlighted the opportunities for dialogue about theory, reality and practice that video materials offered to students as added value. Key limitations for some staff in their use of BoB as a support for video-enriched pedagogic practice were the restricted level of available content on BoB, some difficulties relating to the skills required for creating and using clips and technical stability when using clips.

YouTube is a treasure trove of resources from around the globe and nostalgic video from the past ... However, YouTube is also a vast wasteland of garbage and social parody that adds nothing to the learning process (Jones & Cuthrell, 2011, p. 81).

Introduction

Information Communication Technology (ICT) offers powerful Web 2.0 tools that can benefit learners with different learning needs (Clark, Logan, Luckin, Mee, & Oliver, 2009; Homer, Plass, & Blake, 2008; Tempelaar, Niculescu, Rienties, Giesbers, & Gijssels, 2012). Amongst these, video and media streaming and sharing technologies in particular represent a rapidly evolving area in higher education (Anastasiades et al., 2010; Duffy, 2008; Homer, et al., 2008; Kaufman & Mohan, 2009), with a strong focus on the use of streaming media content as a support for synchronous and asynchronous learning. Those in higher education expect their use of video streaming and sharing in education to grow significantly (Bloom & Johnston, 2010; Kaufman & Mohan, 2009; Williams & Fardon, 2007). Throughout this chapter, when we refer to media streaming (such as YouTube), we also include the notion of media sharing (e.g. sharing comments, video replies).

The rise of video streaming and the increased proliferation of ‘on demand’ television such as BBC iPlayer or 4 on Demand in the UK, Uitzendinggemist.nl or RTL XL in the Netherlands, or FOX and ABC in the U.S., and the rise of digital radio such as Spotify or Pandora Radio, have generated a new stream of web-based media that may be useful for teachers and learners in accommodating different learning preferences. At the same time, an increasing number of institutes are recording lectures to allow students to re-watch the lectures at a time and place of their convenience (Williams & Fardon, 2007). Some learners prefer audio-visual materials to learn, others prefer to learn through audio or through the reading of texts (Jones & Cuthrell, 2011; Mayer, 2003; Thornhill, Asensio, &

Young, 2002). On demand television and radio services provide a variety of digital materials that not only have the capacity to enhance the formal learning experience of students but also offer opportunities to engage students with the wider contexts of current events and real-world scenarios, either accessing these services from ‘traditional’ PCs or laptops or from handheld devices or smartphones. At the same time, media streaming technologies such as YouTube are often considered to have distinct drawbacks for students, teachers and their institutions. These include: the appropriateness of content (both of clips and related social interactions in the form of comments made by students and “externals”) (Jones & Cuthrell, 2011); sharing of TV series and films and related copyright issues; inclusion of advertising; issues around privacy (Bloom & Johnston, 2010) and the ethics of uploading student materials to a public repository. Legal and technical issues often thwart attempts to create institutional video and synchronous learning experiences and repositories (Olaniran, 2006).

In response to these issues, the University of Surrey implemented a customised university-wide media capture, storage and streaming system known as Box of Broadcasts (BoB). BoB allows staff to schedule and capture broadcast TV and radio services which can then be delivered for web-based or mobile viewing. Recordings stored in BoB can be integrated with other systems to further exploit the functionality offered by other technologies. One example is the integration of BoB with a virtual learning environment (VLE), enabling staff and students to engage in discussion forums within the VLE about videos stored in BoB via a safe and closed learning environment. Staff and students are also able to create personalised playlists.

Two years after BoB was first implemented, we felt it timely to explore and understand better how staff (and students) were using and engaging with BoB, which would in turn inform future developments in terms of professional development, training and support from the e-learning centre. As highlighted by Kinchin (2012b) “pedagogy cannot be added to e-learning ... as an after-thought as the implicit values and beliefs required to construct a pedagogy will already inhabit the digital media,

and will underpin the pedagogic discourse that inevitably pre-empts the linear discourse of teaching methods”. In order to provide a powerful learning experience to students in “traditional” higher education, a key starting point is to understand how teachers engage and integrate technology into their classroom teaching (Kinchin, 2012a, 2012b; Luppicini, 2007; Mishra & Koehler, 2005; Rienties & Townsend, 2012). While most students feel comfortable with streaming technology (Jones & Cuthrell, 2011; Williams & Fardon, 2007), limited research has been conducted to identify which barriers hamper or stimulate teachers to engage with streaming technology. Although we acknowledge that students’ adoption of and satisfaction with the technology-enhanced learning environment is crucial for sustainable success of technology adoption, in this chapter we primarily focus on how teachers use streaming technology in general and BoB in particular in their teaching practice.

This book-chapter first discusses two case studies of how teachers engaged students with BoB. It then discusses the perceived constraints on effective use of the BoB system, using data derived from semi-structured interviews with eight members of the university teaching staff. A key aim of the study was to understand better the conditions (technical, pedagogical, organisation or social) that contribute to the development of effective practice in the use of media streaming technology as a support for teaching and learning at the university. Both studies were conducted at the University of Surrey, which is part of the 1994-group and a UK research-intensive university belonging to the top 15% in UK.

How to create a powerful learning environment that works for students and teachers?

While in primary and secondary education teachers provide more room for engagement and interaction with students, in Higher Education a persistent and common practice of teachers is to use (one-way) lectures with limited interaction with students (Struyven, Dochy, & Janssens, 2011). But

research evidence has shown that traditional teacher-centred forms of education such as lectures do not provide an optimal learning experience for all types of learners (Biggs & Tang, 2007; Nicholls, 2001). In a recent study of student perceptions of effective teaching in higher education, Onwuegbuzie et al. (2007) asked 225 students at two US universities to list the three key characteristics that they believed effective university instructors possess or demonstrate. Based upon 2,991 statements, nine themes of effective teachers surfaced: student-centred (59%), expert (44%), professional (41%), enthusiastic (30%), transmitter (23%), connector (23%), director (22%), ethical (22%), and responsive (5%). This demonstrates that while most academic scholars will be experts in their own field and enthusiastic to transmit their expertise to students, students are first and foremost expecting teachers to be student-centred, able to connect to students and to effectively communicate and respond to students' needs. The implication is that universities need to facilitate and support a greater range of strategies for teachers, particularly as demands for flexible learning strategies grow from an increasingly diverse group of learners.

Technology is seen as one of the strategies to provide a good learning experience. Yet despite an increased understanding of how students learn and recognition of the effectiveness of student-centred learning facilitated through ICT, pedagogical challenges remain: "Simply implementing communication technologies for the sake of incorporating technology does not work and the nature or structure of the communication technology is often given less consideration" Olaniran (2006, p. 211). Many ICT innovations have not delivered the fundamental changes in higher education that many teachers and researchers hoped for (Mishra & Koehler, 2005; Resta & Laferrière, 2007; Rienties, Kaper, et al., 2012). This has been attributed to a lack of organisational embedding of innovation (ICT in particular) and a lack of understanding of the essential parameters for effective teaching with ICT (Kinchin, 2012a; Mishra & Koehler, 2005; Rienties, Kaper, et al., 2012).

One aspect of successfully implementing ICT in education is to the importance of adjusting the content of a module in line with the technology selected and pedagogical approach used. Mishra

and Koehler (2006) designed the Technological Pedagogical Content Knowledge (TPACK) model for successful learning using ICT on this premise. The authors show that learning is most effective when teachers have appropriate awareness of the complex interplay between pedagogy, technology and discipline knowledge. In order to effectively address students' needs, teachers need to have sufficient content, pedagogical and technological knowledge.

In practice there is often an imbalance between the technological, pedagogical and content knowledge of a teacher and how academic development addresses these three key areas (Kinchin, 2012a; Lawless & Pellegrino, 2007). Technological knowledge is often seen as independent from content and pedagogical knowledge (Kinchin, 2012a; Mishra & Koehler, 2006; Rienties & Townsend, 2012; Ziegenfuss & Lawler, 2008). As an example, a science teacher thinking about using a new ICT tool in education may consult a direct colleague or a teacher educator or a learning technologist for advice on how to effectively implement the technology into science education (Ziegenfuss & Lawler, 2008). If the science teacher decides to use video cases about optimising the performance of an internal combustion engine, it would be important to incorporate the videos into the module design (e.g. by having a task where students search for and share alternative videos of engine building in an online repository and then critically reflect on peers' contributions), into the content (e.g. by discussing the various internal combustion mappings in class based upon the discourse in the online repository) and into the pedagogy (e.g. by using a collaborative learning approach rather than using a traditional lecture-based approach) (Rienties, Brouwer, Lygo-Baker, & Townsend, 2011; Ziegenfuss & Lawler, 2008). Otherwise it is likely that many of the students will not actively share videos and/or use the online repository and opportunities for deep and/or collaborative reflection amongst peers may be lost or overlooked. As a result, the teacher's motivation to use an ICT system like Box of Broadcasts may fade and there may be a negative impact on the perceived affordance and usability of BoB.

Research has also suggested that content knowledge often determines the pedagogical approach taken and the adoption of particular technologies (Koehler & Mishra, 2005; Mishra & Koehler, 2006). For example, in a review of 118 course designs for transitional, remedial education Rienties et al. (2012) found that teachers from 22 countries consistently aligned content with their pedagogical approach. However, the use of technology in these 118 courses was not found to be related to the teachers' content or pedagogical approach. As a specific example, maths teachers who taught a basic algebra course to undergraduate business students adopted a similar pedagogical approach, but the affordances and ranges of ICT tools were extremely diverse.

Media-streaming

Media streaming technology is a rapidly evolving area in higher education (Bloom & Johnston, 2010; Kaufman & Mohan, 2009) with much research already conducted in effective usage of videos in the classroom. For example, research by JISC (Joint Information Systems Committee) (Thornhill, et al., 2002) focused on best practice in the use and development of video-enriched learning environments, with a particular emphasis on the use of streaming media content as a support for synchronous and asynchronous communication. The focus of this early research was largely on the transition from earlier historical modes of video use (e.g. educational television, VHS tapes, CD-ROMs and related multimedia to DVDs) and on instructional video materials, such as lecture content or subject specific content (Williams & Fardon, 2007), particularly targeting distance learning (Luppicini, 2007; Mayer, 2003). The JISC 'Click and Go' (2002-2004) project sought to provide a guide for educators that clarified the "tangled interplay between the various technical, pedagogical and infrastructure questions" linked to the use of audiovisual technologies and the "learning materials and learning activities associated with them" (Thornhill, et al., 2002). The JISC project identified five characteristics (Table 1) as being valuable in the use of media-streaming video technologies as a support for teaching and learning.

Table 1: Value-Added Characteristics of Video in Education

Characteristic	Value
Visualisation	Video as a moving image helps the student to visualise a process, an event that might be difficult to represent through a text form.
Illustration	Video reinforces the power of a still image or graphic, it can show an example of how something works, moves or performs.
Validation	Video reinforces what is being said in the classroom, it validates knowledge through a moving image or representation.
Explanation	Video helps to describe visually an explanation of a procedure or process through a ‘show and tell’ style.
Motivation	Video can make content alive and bring it into the classroom.

More recently, the rise of social media such as YouTube (Bloom & Johnston, 2010; Duffy, 2008) and the growth of ‘on demand’ television and radio has generated a new stream of mainstream and niche web-based audio and televisual media that is potentially useful for teachers and learners, particularly in terms of students’ engagement with current events and real-world scenarios (Kaufman & Mohan, 2009; Smart, 2010). However, the ability to negotiate this wider media stream is an issue for educators as is the integration of such media into more formal learning environments, both face-to-face and at a distance. Jones and Cuthrell (2011) refer to this as the dichotomous nature of YouTube, whereby teachers can find excellent videos appropriate for their subject but at the same time find various social parodies and inappropriate, unreliable or non-scientific videos that may be off-putting and/or disrespectful for (some) students from different cultures. Although an essential graduate skill of students is to be able to select, interpret, use and re-create content from large databases like YouTube, in particular in the first two years of undergraduate programmes some

students may be overwhelmed by the sheer amount of YouTube clips available on a given topic.

Some students may lack an in-depth understanding of the discipline to select the most appropriate or relevant content and create their own mental maps.

The collation of educator perspectives on the pedagogical aspects of video streaming activity from mainstream and niche audio and televisual resources in teaching and learning environments therefore appears timely and desirable (Jones & Cuthrell, 2011; Kaufman & Mohan, 2009). Some commentators (Smart, 2010) are referring to this new stream of web-based broadcast technologies as the Web 3.0 Metaverse (i.e. the convergence of virtual and physical worlds). Trends and developments in the future shape of the Internet point to TV-quality open video, increased use of augmented reality interfaces and of pervasive broadband, wireless and sensory technologies. We are, as suggested by Duffy (2008) and Smart (2010, p. 9) in a time when “the internet swallows the television”.

What does Box of Broadcasts do?

BoB (Box of Broadcasts) is a university-wide media capture, store and streaming system launched in March 2009 as an enhancement for teaching and learning across the university. BoB allows staff to schedule and capture broadcast TV and radio from both the UK and overseas, as illustrated in Figure 1. Captured broadcasts are transcoded for multiple delivery formats e.g. web-based or mobile viewing. Staff are also able to create a personalised repository through the use of a personal account area in *myBob* and, within that, to create and use individualised *playlists* as illustrated in Figure 2. These playlists can be further enhanced for searching by adding relevant metadata and/or through user generated naming of labels. Playback is streamed, allowing for quicker, non-linear playback and greater control over copyright materials. User control is also managed by the university through allocated rights at different levels, which currently at this university was set such that only staff and not students were allowed to record a broadcast.

Figure 1: Screenshot of Scheduling and capturing broadcast TV and Radio

The screenshot shows the BOB (Box of Broadcasts) Electronic Programme Guide website. The browser address bar displays the URL: <http://bob.surrey.ac.uk/guide.php?guidestart=1324058400>. The page title is "Electronic Programme Guide". A search bar is present with the text "Search for a programme to record:". The date and time displayed are "6:00PM to 9:00PM, Fri 16th December 2011".

The main content area is titled "Freeview TV" and displays a grid of programmes for various channels. The grid is organized by time slots: 6:00pm, 7:00pm, and 8:00pm. The channels listed include BBC ONE, BBC TWO, BBC THREE, BBC FOUR, BBC NEWS, BBC Parliament, CBBC Channel, CBeebies, Channel 4, Channel 4+1, Dave, E4, E4+1, Film4, FIVE, FIVER, FIVE USA, ITV, ITV1, ITV2, ITV3, ITV4, More 4, News, QUEST, QUEST, Russia Today, SKY THREE, and Sky News.

Programme titles visible in the grid include: BBC News at..., BBC London..., The One Show, EastEnders, The Two..., Strictly Come Dancing..., The Culture Show, Mastermind, MasterChef..., No programme information..., Top Gear USA, Merlin, World's..., No programme information..., World News..., Transatlant..., Still Ringing After All..., BBC News at..., Sportsday, BBC News, BBC News, News..., This Week, Select Committees, Chri..., Show Me What..., No programme information available, Waybul..., In the..., C..., No programme information available, The Simpsons, Hollyoaks, Channel 4 News, Come Dine with Me, Christmas..., Come Dine..., The Simpsons, Hollyoaks, Channel 4 News, Helicopter..., Dragons' Den, Top Gear, The Big..., The Big..., Hollyoaks, How I Met..., Desperate Scousewives, Scrubs, Scrubs, The Big..., The Big..., Hollyoaks, How I Met..., Whisper of the Heart, Zoolander, Home and..., Ok! TV, 5 News at 7, Fifth Gear, Ice Road Truckers..., Malcolm..., Home and..., Neighbours, Malcolm..., Alphas, Law & Order, CSI: Crime Scene..., CSI: New York, Best Dish: The Chefs, London..., ITV News..., Emmerdale, Coronation..., London..., ITV News..., Emmerdale, Coronation..., Wild..., Coronation..., Judge Judy, Judge Judy, The Cube, The Xtra Factor: Best..., Heartbeat, Pie in the Sky, Agatha Christie's Poirot, UEFA Europa League..., Imploders, Nature's Fury: Monsoon, Relocation..., Come Dine with Me, Grand Designs, Newshour, News Live, Two..., Frost Over the World, The..., The..., American Chopper, American Hot Rod, Santa Rosa Tourmaline..., Capelinh Sphene Selection, AAA Tanzanite Selection, Latest News, Moscow Out, Latest News, Cross Talk, Moscow Out, Russia..., Road Wars, The Real A & E, Nothing To..., Nothing To..., Sky News at..., Sky News, Sky News, News, Sport, Weather.

Figure 2: Screenshot of playlist on engineering

University of Surrey Box of Broadcasts — Playlist - Windows Internet Explorer

http://bob.surrey.ac.uk/playlist.php?id=283&playlistfrom=results

File Edit View Favorites Tools Help

★ Favorites | Web Slice Gallery | desktop | go.microsoft.com-fwlink-Lin... | ulearn.surrey.ac.uk-webct

University of Surrey Box of Broadcasts — Playlist

How Do They Do It?

25/08/2011

Engineering series. Robert focuses on the construction of one of the world's most common passenger airliners, and examines the engineering behind a modern chainsaw (13/20). [S]

In Search of Speed

25/09/2011

2/3. The Battle of the Rocket Men: Documentary recalling the story of air speed records in the immediate postwar years, with designers setting their sights on breaking the sound barrier. [AD,S]

In Search of Speed

18/09/2011

1/3. The Battle of Bonneville: Documentary about the attempts by Craig Breedlove and Art Artons to break the land speed record, a near-lethal contest which saw many barriers broken. [AD,S]

How to Build a Super Car

20/11/2011

2/3. Documentary following Formula One racing team McLaren as they build a road car, the MP4-12C, using some of their cutting-edge F1 technology. Also in HD. [S]

How to Build a Satellite

27/11/2011

3/3. Documentary following manufacturer Astrium as they assemble one of the most complicated machines in the world, a state-of-the-art communication satellite. Also in HD. [S]

How to Build a Jumbo Jet Engine

04/12/2011

2/3. The story of the thousands of people who design, build and test jet engines at Rolls-Royce's manufacturing plants across the UK, and the astonishing technology behind the engines. [AD,S]

Staff use is capped at 25 recordings scheduled at any one time. A particular merit for language, political science and sociology teachers is that 30 channels in French, German, Arabic, Russian, Spanish and Italian, which are commonly not part of TV subscriptions in the UK, are also available. A system buffer of 8 days is in place for 11 main TV channels and 6 main radio channels, so that if a teacher forgets to schedule in advance the recording of a broadcast, they are still able to capture the desired video clip after the broadcast has taken place.

Copyright Issues

Complex rights exist around broadcasts, sound recordings and films, and copyright is an important but complex issue for any user of YouTube or BoB. A particular merit of BoB is that teachers are able to record, store and share off-air broadcast materials through the Educational Recording Agency + (ERA+) licence arrangements which govern use of BoB at the university. Access to BoB materials is restricted to University of Surrey staff and students and the UK geographical region. Whilst BoB allows for content to be uploaded, the ERA+ licence does not permit recordings of any non-broadcast material to be used such as commercial DVDs or YouTube content. This creates a dichotomous situation for staff and students who accessing both a ‘walled garden’ (BoB) and a ‘wild meadow’ (YouTube, etc.). While teachers are in full control of the videos and materials of BoB, the wild and vast meadows of YouTube are constantly changing. In YouTube, new videos appear at an unprecedented rate, but at the same time many ‘flowers’ are removed or repositioned, potentially leading to anxiety amongst teachers whether the materials in the shape and ‘appropriate’ format will actually be available during their module.

Research Questions

In Study 1, we explore two case-studies about how a language teacher and psychology teacher redesigned their course model by implementing and integrating BoB in a pedagogically innovative manner. Following on from this, we explore the overarching research question of Study 2 which

sought to ascertain the perceived benefits and limitations of the adoption and use of BoB as a support for teaching and learning within the University of Surrey. A related and subsidiary question focused on effective practice in the use of BoB. Three research aims, framed by Mishra and Koehler's TPACK model were identified:

- To explore staff use of/perceptions of BoB (*Technological Content Knowledge, Technological Pedagogical Knowledge*)
- To contrast the benefits and constraints of YouTube versus BoB (*Technological focus*)
- To understand potential benefits and constraints on the use of BoB and media streaming technology for staff members (*TPACK*)

Method

Study 1 Two case-studies of Box of Broadcasts

To enhance the reader's understanding of how teachers at University of Surrey use BoB, we selected two case studies of teachers from Psychology and Languages who were using BoB. In Study 1, we use principles of design-based research (DBR) in order to critically reflect on how the two teachers have redesigned their courses by integrating BoB (Collins, Joseph, & Bielaczyc, 2004; Reeves, Herrington, & Oliver, 2005; Rienties & Townsend, 2012). According to Collins et al. (2004, p. 21), "[d]esign experiments bring together two critical pieces in order to guide us to better educational refinement: a design focus and assessment of critical design elements". Although design research is set in real educational settings where teachers want to improve learning of their students, theoretical foundations (i.e. TPACK) and claims for design research are essential for identification of educational problems and possible solutions (Reeves, et al., 2005; Rienties & Townsend, 2012). According to Reeves et al. (2005, p. 107), "[t]heory informing practice is at the heart of the [design

research] approach, and the creation of design principles and guidelines enables research outcomes to be transformed into educational practice”.

Study 2 In-depth interviews of teachers using BoB

In a two month period across June and July 2011, we aimed to identify technical, organisational and/or social issues (real or perceived) that enhance or constrain the adoption and use of this media streaming technology using semi-structured interviews with selected staff. Study 2 aimed to identify examples of good (and ‘bad’) practice that can be used to support and encourage take up of BoB by the wider community of staff and students, or to extend and inform the ongoing practices of existing users.

Participation and Sampling

Participants in the study were selected from staff members across all four faculties of the university (Business Economics and Law, Engineering and Physical Sciences, Health and Medical Sciences, Arts and Humanities), who were identified as being users of BoB. Participant sampling was based on a range of criteria including: usage levels, faculty/departmental affiliation and/or as being someone who has (based on user statistics drawn directly from BoB) an active interest in the use of BoB as a support for teaching and learning. Of the latter, an indicator used was the number of broadcasts recorded, with numbers scheduled ranging from a low of 54 to a high of 182 and total number of uploads. In addition, types of use were used to identify teaching staff with particular experiences of BoB, e.g. making playlists, using clips or uploading user-generated video materials. A selection of 18 potential interviewees was identified, whereby eight staff members were eventually interviewed, representing each of the four faculties. Of those who were approached and were unable to participate, a majority cited incompatible interview dates (e.g. they were on leave, had insufficient time due to other commitments, or had left the university in the interim period).

Procedure

The study adopted a largely qualitative approach alongside a small sampling of statistical data on user activity from the BoB system. Data were collected using individual semi-structured interviews of 45 minutes followed by a 15 minute talk-through of users' *myBoB* accounts with each participant. An interview schedule was used to guide participants using three basic themes: (1) use of BoB and media streaming technology more generally, (2) pedagogic implications of using BoB as a support for teaching and learning, and (3) staff perceptions of what constitutes 'good practice' in the use of. In line with TPACK, these three key themes were used to draw out, organise and analyse staff perceptions of the use of BoB and media streaming technology more generally as a support for teaching and learning. Consideration was also given to staff motivation, skills and experience in the use of technology generally and of technologies available. Participant interviews were transcribed and coded using a mixed inductive/deductive thematic approach which combined *a priori* themes from the interview schedule and *inductive* themes grounded in the data.

Results

Study 1: Two Case Examples of Box of Broadcasts

Case 1: Language Learning, Student Portfolios and Video

A language teacher had designed a learning module whereby second language students were expected to present a topic of interest in a respective language; this was video recorded to facilitate review and reflection on presentation skills and language use, as recommended by Dlaske and Krekeler (2008). Prior to BoB, the procedure for capturing and disseminating student presentations with digital video was very onerous, both for the departmental technician and for the teacher in charge of this area of students' learning, with each presentation being captured to camera, edited and stored on DVD for each individual student. The teacher also experimented with maintaining digital

video recordings of individual student presentations on her hard disk and for students to call and collect these using a USB stick. Both designs were very time consuming and deemed an inefficient process for students and the teacher.

If you have 30 students coming with a USB – they have to plug it in, you do some small talk, shop talk with students while you're transferring the data. That – 30 times over – is not efficient use of tutor time.

Nevertheless, both formats worked well to establish procedures for capturing and assessing student performance with digital video. When BoB was introduced in the redesigned module, it was an easy matter to transfer this process across in BoB. In the current year, 130 (i.e. four times more students than in the original design) students made use of BoB as an interface for their professional presentations.

Using BoB meant that access to the videos could be streamlined, as illustrated in Figure 3. Whilst there was some work for the teacher in communicating individual access codes to students and some work for the technician in managing video data and uploading it, time was saved overall as the teacher no longer had to meet with students individually and the technician no longer had to create individual DVDs for each student. Furthermore, students could access their video data anywhere, anytime. The video data captured formed a part of students' Personal Development Plans and could be used to provide a supportive illustration of their skills to potential employers. For the teacher involved, BoB made a substantial difference to her practice and enabled the practice (which students view as highly valuable) to continue where, given the problematic logistics of the previous method and quadrupling of student numbers, it might well have been laid aside.

Figure 3: Sample instructions for use of BoB in Language case

From: [redacted]
Sent: 07 February 2011 13:11
To: xxxxxxxxxxxxxxxxxxxx
Subject: FW: Enlace al video de la presentación
Importance: High

Dear xxxxxxxx,

Below you have your personal code to watch your presentation in BoB:

XXXXXXXXXX

To access your clip, open BoB in <http://bob.surrey.ac.uk/>. In the main page copy the code above in the box "Search the archive", which I have highlighted in a red circle in the image below:

Once you have viewed your clip, write your reflective report on it in Pebblepad, <https://www.pebblepad.co.uk/surrey/>, following the instructions below – the ones we went through in class. The deadline to write your reflection in Pebblepad and share it with me is **Monday 14 de February at 5pm**:

1. Write your University username and password to enter Pebblepad.
2. Create New
3. Ability
4. Give it a title: SPA1026 Presentación oral
5. Click 2: evidence. You don't have to do anything, but if you want, you can link here your clip from BoB
6. Click 3: reflection: Copy here your reflection of the presentation – no longer than 400 words.
7. Click 4: click Send to: click Gateway (for LTS students) y click person Law or BM with Spanish students.
8. If click Gateway > select languages 2010 PDP portfolio
9. If click person > write my name (Maria) and surname (Menendez-Lopez) and select the first email in the list.

If you have any questions please write me an email.

BoB has made a real difference to something that was very cumbersome for everyone involved. It has cut the time and logistics. I actually think we would have left it aside and not continued with student presentations if we hadn't had this facility with BoB. Also, the fact that the technician is able to do this so efficiently means that it can be extended to other tutors – German, English, French – especially for colleagues who are perhaps not so confident with technology as I am.

In terms of the value to students, the teacher indicated that – in pedagogic terms – the advantage of videoing the presentations was to enable students to see their own performance. Using video data allowed students to detach themselves from the process, and reflect upon their process in terms of writing a report. In this sense, it is important for effective use of video data that there is a coherent plan for student review and reflection on the content of the video, whether those elements are formally assessed or not (Bloom & Johnston, 2010; Olaniran, 2006). It is an activity that, by all accounts, students appreciated and valued highly.

Case 2: Using playlists in BoB to highlight complexities in Psychology

A psychology teacher had developed effective practice by integrating broadcasts recorded off air via BoB with a VLE. This teacher's method of facilitating and guiding students in their use of video material through use of playlists and Q&A was also exemplary as a model of good practice. For example, she organised her playlists by category (cognitive psychology, individual differences, personality, intelligence, etc.) and created separate playlists for modules covering subject areas such as attitudes and behaviour, and psychology and education.

The teacher actively encouraged students to view her playlists, either as a source of additional contextual material or as a specific activity. In the case of the latter, she would tend to link the video to related Q&A activities or discussion tasks in the VLE, as recommended by Mishra and Koehler (2005). She also indicated that it was necessary to proactively engage and guide students in their use of video materials, helping them to understand that watching videos was not just about 'fun' or something different from reading but that it formed an active part of their learning. In terms of ways of using video for teaching and learning, she divided these into two types: classroom delivery and additional context. For the former, short clips were more suitable and for the latter, this might involve students watching a longer episode at home or outside of class or lecture time.

I would never show more than a short clip in a lecture, unless it was really, really important to show something more substantial. At the same time, I do like to make resources available to students for their own study time. I have been surprised by how many of them actually go away and use these additional materials. In this way, my approach has evolved over the last few years. I give students a few little bricks to build upon, resources for self-study, and BoB is a large part of that, in terms of giving students the opportunity to look at things they might otherwise not look at or consider.

This had, over time, led the teacher to think differently about students and the teaching and learning resources she made available to them.

BoB has been a big part in a shift of thinking for me. It has made me realise that there are opportunities to develop student's thinking – to engage them in independent and critical thinking outside of the lecture. It has also made me realise that what the student can do outside of the lecture is not just read papers, make notes and pull things together but is part of a bigger practice of thinking about things and assimilating ideas.

The increased range and variety of learning materials available to students was also identified as an important shift in her pedagogical values and in motivating students. Furthermore, BoB materials were identified as being particularly supportive for students in their final year, where modules tend to be more research-led and students follow specialised topics in smaller groups. It was felt that the range and variety of materials available via BoB was particularly well-suited to those circumstances.

I think students engage with video in a better way. It provides variety as well. They do a lot of reading and I think it's nice, in study time, to do something a bit different and I

actually think it encourages more discussion amongst students. I've heard them in the lecture saying, oh, did you watch the documentary on so and so and what did you think about this bit – you know, actually discussing things and I suppose it's a bit more interesting for them and they want to talk about it more than say, they do with a paper.

Study 2 In-depth interviews of teachers using BoB

Use of BoB in Teaching and Learning

Analysis of user statistics for BoB for the period of April 2009- February 2012 show that the system at the University of Surrey had 334 unique users (teachers) who requested 3,082 unique services. In total 29,729 total services were watched, while teachers uploaded 618 unique videos, 412 playlists and 333 clips. According to the eight teachers interviewed, staff perceptions of BoB as a tool to enhance teaching and learning were generally positive. A range of technical and training issues were identified by a majority of staff but it was not felt that these were insurmountable. Most staff recognised these as 'teething issues' of the kind generally associated with the adoption of new systems as identified by Olaniran (2006) and Rienties and Townsend (2012). In many cases, technical issues raised had been successfully resolved via the university's e-learning team.

Awareness of BoB and Decision to Use

Staff members became aware of BoB in a variety of ways with a majority citing interactions with staff from the e-learning team as being a dominant factor in their take up of BoB. Staff mainly identified their rationale or decision to use as being closely interlinked to their individual interests (in innovating pedagogy and technology) or to a specific need arising in their plans for teaching and learning.

- *I teach a particular module called ‘Television Entertainment’ and I needed materials and used some clips for that.*
- *I’m new to the university and to teaching and, having come out of clinical practice into teaching, I’m trying to use BoB to enhance my teaching... so it’s blended, varied, to promote discussion and to illustrate certain points/themes.*
- *I’m a module convener and I chose to record some programmes about organisational behaviour in my role as module manager, it’s useful to illustrate what happens in real life and how that relates to the theory we’re teaching.*

Others suggested that it was only after their use of BoB that they generated ideas about its utility as a support for teaching and learning.

- *I first came across BoB about the time of the Haiti earthquake and I used BoB to record that and I used it in an Earthquake Engineering module.*
- *I realised it would allow me to make recordings. Previously, I got our technicians to tape things from TV and they put it on DVD so that I could show it in a lecture but this didn’t allow students to watch it in their own time and I couldn’t cut out a specific clip. Those kinds of things make BoB more flexible and probably more attractive to students as well.*

Overall, staff perceptions were that BoB was a useful technology in that it allowed them greater control and flexibility in their use of audio and televisual materials as a support for teaching and learning, as illustrated by the psychology teacher case study 2. Furthermore, it allowed them to target relevant, real-world scenarios that served to illustrate links between theory and practice, to promote discussion amongst students and between staff and students and, as described in the language teacher case study 1, to provide a secure environment for easy dissemination of student-generated content

(videos of student presentations). Staff mostly focused on the use of material from broadcast television. A smaller number, however, mainly from sociology and psychology, pointed to the utility of radio services, citing Radio 4 (a British discussion/news radio) in particular, as a useful support for dialogue, discussion and context-building for students.

Types of Use, Training, Confidence, Motivation and Skills

Staff were mainly using BoB to record and view services. The majority of staff were confident in their use of BoB at a basic level (i.e. recording, making playlists), etc. but felt less confident about more complex activities such as making clips or uploading video. However, all expressed an interest in learning more about BoB's functionality. Similarly, staff tended not to use the search facility within BoB, indicating that either they did not know how to do so effectively or that when they used BoB, they did so with a specific purpose in mind and so went directly to the service they had decided to schedule/record. A majority of respondents made use of playlists, with only one staff member not having made any. Some staff were using this facility in effective and innovative ways such as matching playlists with course content or providing students with a set of relevant resources in a course-framed repository within VLE.

About half of respondents had tried making and using clips, with varying degrees of success and failure. The general perception of staff was that clips were not only useful but potentially essential in terms of making effective and appropriate use of video with students in and beyond the classroom, with time being a key factor of import. At the same time, the generation and use of clips was one of the most cited issues raised in terms of the limitations of BoB in its current state. The general view of staff members who had used the clips feature was that it needed to be more reliable, that it would benefit from a tutorial video for updating skills that had not been used for some time and that a showcase video of effective and/or innovative clip use would be beneficial for staff wishing to use

this feature. Only one member of staff was currently using BoB to upload and share user generated content.

The Benefits and limitations of YouTube

Staff perceived a benefit of YouTube over BoB as being the provision of a wider range of content as found by Jones and Cuthrell (2011). Other benefits identified by staff were that YouTube includes some commercial content unavailable via BoB, clips can be easily embedded in presentations and the brevity of YouTube clips is often more useful in a teaching and learning setting (Duffy, 2008). YouTube was also deemed particularly useful for language learning in terms of providing native source materials (Bloom & Johnston, 2010). YouTube is easily accessible to staff and students without need for additional logins (Olaniran, 2006).

- *The thing about YouTube is that people upload all kinds of things and I use it a lot to research things to do with mental health and psychiatry. There are lots of really interesting clips around psychology and things like that and I use those a lot and save them as bookmarkers, then when I come to do a teaching session, I embed them as a URL in my session.*
- *Compared to YouTube, BoB is limited – you can only look at TV programmes, whereas YouTube has a mix of everything.*
- *I found some interesting clips on YouTube from an NHS (National Health Service) Trust which were really good for my teaching session.*
- *The beauty of YouTube is that the clips are very short. They are readymade clips of 2, 3 or 5 minutes which is really good just for capturing students' attention or relaxing their minds for reflection.*

Staff nevertheless recognised that there were definite limitations with YouTube as a support for teaching and learning, as recently also highlighted by Jones and Cuthrell (2011). These included: appropriateness of content (both of clips and related comments); inclusion of advertising; instability of URLs; lack of control over continued availability of content (fear of useful clips disappearing); issues of potential copyright infringement; management of useful clip libraries/playlists; privacy and ethics of uploading student materials to a public repository and related issues of ownership and control of uploaded content.

- *The problem with YouTube is that they are not stable URLs and, of course, the copyright question on YouTube is such that content frequently appears and disappears.*
- *Some YouTube content is prefaced by advertising and you can't just say to students, now we're going to watch a 90 second commercial and then we'll get to the interesting part.*
- *With YouTube, there is the question of quality – some YouTube content goes down to the very minimum of what works on a project screen.*
- *With YouTube, you either embed lots of clips somewhere or you're left wondering ... now where did I find that YouTube clip exactly? You know, which pathway did I go down to get there. So, BoB is better there because you can save your clips onto your own bit (myBoB).*
- *Where can we store student work? On YouTube? I don't want YouTube – that was an alternative we looked into, maybe having a closed group on there, but we wanted something more private in the end. You don't know what's going to happen with YouTube. Bob is private and we've got ownership as well.*

An interesting point was made by one member of staff regarding the appropriateness of related content on YouTube (i.e. user comments) insofar as her experience contrasted with most staff members' view of 'related content' on YouTube being a limitation. By contrast and in line with findings from Bloom and Johnston (2010), she argued that user comments could be a positive stimulus for student discussion, debate and reflection.

- *Some YouTube content is quite good as an illustration. Sometimes the comments around a YouTube clip are really useful, if you're looking at attitudes. Like "Extreme Breastfeeding" – some comments are really quite controversial – that makes for a good discussion point, it's good for illustrating attitudes at large to certain areas of healthcare.*

Benefits, Limitations and Constraints in the use of BoB (Technological knowledge)

Staff perceptions on the benefits, limitations and constraints of using BoB were almost equally spread across all three of these indicators. Staff felt that the availability of BoB was useful, that it did offer enhanced functionality for technology-supported, video-enriched learning, and that it had the potential to add value to students' learning through the easy availability of real-world scenarios, personalised content and integration with related formal learning environments such as VLE. The most valuable advantage was deemed to be the ability to store such media indefinitely and securely, without fear that it would disappear or be withdrawn overnight, thus enabling staff to reuse materials in parallel with related teaching and learning resources, year on year. In addition to these 'BoB-specific' advantages, staff highlighted the opportunities for dialogue between theory, real-world scenarios and practice that these video materials offered to students by way of added value. Key limitations of BoB as a technology tool focused on instability of the system, and issues relating to user authentication, which are highlighted by Olaniran (2006) as key concerns for successful

campus-wide implementation. Constraints of BoB as a useful support for teaching and learning focused on lack of time for staff developing, maintaining and planning around resources, lack of access to certain useful content, low buffer period and copyright restrictions.

- *BoB is useful to illustrate what happens in reality... how that reality relates to the theory we teach. Documentaries can support the key message of a lecture very well.*
- *BoB gives students' access to documentaries, e.g. about mental health care in the community.*
- *There may be some things that only become significant with hindsight, e.g. an emerging news story that might inform your teaching and students' learning.*
- *Visual images, especially moving images is a great bonus in my subject area (geology)... something like a volcano erupting or a landslip sliding... video is so much better than a still image.*

Furthermore, even though bandwidth issues are less prevalent in 2012 than when Olaniran (2006) published his work, the comments of the respondents below do reflect his argument that universities need to take a holistic view when implementing new technology that is synchronous in nature and requires appropriate hardware in the classroom.

- *The University has failed to put in a reliable infrastructure across lecture rooms, sometimes there's no LAN or even a desktop, so you have to rely on your laptop and a wireless connection which isn't reliable and doesn't offer a reliable audio system so that makes playing video clips not worthwhile.*
- *One of the biggest limitations is that you go to use BoB in and it doesn't work in some of the teaching rooms.*

- *I was in a teaching room with computer access, had my PowerPoint up, went in to open BoB and it took a while because it seemed to think I was trying to log in remotely for some reason.*

User authentication in BoB was viewed by staff as both an advantage and a limitation, depending on how this was used. The privacy and security of authentication was valued as a means of controlling viewing of user generated and/or sensitive content (e.g. medical or health-related video clips). At the same time the requirement for a dual login process for embedded or linked BoB services in VLE was viewed as a limitation that could easily be improved through the use of a single sign-on for both systems.

Constraints

Staff time

Lack of time to fully engage with new technologies in terms of training, planning to use, and identifying ways of embedding them in their everyday practice was the key constraint identified by staff members. The importance of time to learn to implement ICT effectively into education has already been extensively documented in the literature (Lawless & Pellegrino, 2007; Luppici, 2007; Resta & Laferrière, 2007; Rienties, et al., 2011; Stes, De Maeyer, Gijbels, & Van Petegem, 2011; Ziegenfuss & Lawler, 2008). Staff generally only found time when notice of a training course coincided with free time or when an urgent need to make use of video materials in their courses precipitated their participation in a course or their investigation of BoB as a possible technology to support video-enriched teaching and learning. Other than these approaches, the most often cited stimulus for getting involved in use of BoB was recommendation by a colleague who had used the tool already. Such recommendation might simply be a passing conversation or it might involve a

more engaged introduction, incorporating either a demonstration, or an illustration and/or provision of informative or instructive materials (e.g. a user guide).

Scope and nature of available content

Staff had mixed views about content, with some staff happy that it sufficed (e.g. humanities) and others feeling that it lacked coverage of certain key services/channels that were beneficial to their more industry-specific areas e.g. engineering, film studies, languages. There was an awareness and understanding of copyright and budgetary constraints but nevertheless staff still wished to express their desire for more relevant content.

Staff were generally *au fait* with and accepting of copyright restrictions imposed by UK law and framed by the University's adherence to the ERA+ licence. Although they understood the need for these, some expressed a desire that they could be a little more flexible, particularly in terms of extending use to overseas enrolled students of the University who they felt were being denied parallel distance learning opportunities to their UK counterparts. Some staff also expressed regret that services from YouTube could not be embedded in BoB as this would address a key issue of materials disappearing without notice. At the same time, they recognised that this was a difficult issue to address, given the open nature of YouTube content.

- *I used BoB to record a programme about the Haiti earthquake and I used it in the Earthquake Engineering module but I couldn't use it fully as I was up against restrictions in that this module was offered by distance learning (beyond the UK) and students couldn't access it. Three of our major MSc modules involve distance learning with overseas students and this is an issue as it means we wouldn't be treating all students in the same way in terms of available resources.*

In addition, one of the key limitations of BoB for many staff users related to the inability to bring in relevant YouTube clips to that environment. Staff recognised that this was an issue of UK copyright law and the potential for infringement of third party materials and/or the way in which YouTube links through to recommend other videos which might be less appropriate in an educational setting. However a majority expressed a strong desire to be able to bring in their YouTube finds to the BoB environment in cases where copyright was clear and materials were being offered by commercial broadcasters for educational or other public use. Based upon the discussions with staff and our own reflections, in Table 2 we highlight the main advantages and disadvantages of BoB and YouTube.

Table 2: Comparison of BoB (as used in Surrey) and YouTube

	YouTube	BoB	Notes
Web-based, ease of access with smart-phone			Students and staff need to log into BoB using their university credentials
Richness of # of videos available			Infinite amount of videos in YouTube, in BoB only what teachers have recorded or uploaded
Quality of videos available relative to # of videos			YouTube has enormous wasteland of materials (Jones & Cuthrell, 2011)
Secure storage of student (sensitive) materials (e.g. presentations, clinical records, portfolio)	N.a.		Although YouTube allows “private” video sharing of the URL with a maximum of 50 views, anyone who has the URL could watch this video.
Secure storage of videos
Lack of advertisements and comments non-relevant to educational setting
Ability of teachers to record TV and radio programs	N.a.		Teachers can record any program within UK license restriction and share this with students. If a teacher has recorded a program on separate medium (not YouTube), YouTube can still

Ability of teachers to upload and edit videos and provide comments		remove content While both system-uploads work similar, the editing functionality of BoB is more complex and cumbersome.
Ability of students to upload videos and provide comments	N.a.	This is a particular design decision by University of Surrey

Note: rating is based upon (perceptions of) the authors of the functionalities and affordances of the system and use by academic staff at this institute at the time of writing. New functionalities of BoB and YouTube will influence the ratings.

Discussion

This book chapter addressed a new innovative media-streaming technology called Box of Broadcasts (BoB), which is used by 300+ staff at the University of Surrey to engage students with relevant and current video materials. Media streaming technology such as YouTube is a rapidly evolving area in higher education (Bloom & Johnston, 2010; Kaufman & Mohan, 2009). A unique feature of BoB in comparison to YouTube is that it allows staff to schedule and capture broadcast TV and radio services, which are then transcoded for web-based or mobile viewing. A particular merit for language, political science and sociology teachers is that 30 channels in French, German, Arabiac, Russian, Spanish and Italian are available, which are commonly not part of TV subscriptions in the UK. Staff and students are also able to create a personalised repository and can engage in discussions about the videos stored in BoB via a safe and closed learning environment. A key aim of the study was to better understand what TPACK conditions (technical, pedagogical, discipline specific knowledge) contribute to the development of effective practice in the use of media streaming technology as a support for teaching and learning at the University.

Using principles of design-based research (Reeves, et al., 2005; Rienties & Townsend, 2012) of two case-studies of BoB usage in Study 1, we found that BoB provided an efficiency improvement for the language teacher who filmed her students' presentations in their second

language. Furthermore, the videos could be used for students' Personal Development Plans as an illustration of their employability skills. In the second case-study, a psychology teacher used topical playlists to broaden and extend the discussions in and outside her classroom. The integration of BoB into her classroom led the teacher to think differently about students and the teaching and learning resources she made available to them. Both case-studies highlighted that teachers can successfully design and implement BoB in a range of pedagogical scenarios, which provided them with additional ways to provide feedback and engagement. At the same time, both teachers still experienced some technical and organisational difficulties, as was found in other studies (Olaniran, 2006; Ziegenfuss & Lawler, 2008). Both teachers were able to overcome these, but it stresses the need for teachers to be(come) knowledgeable in pedagogy, discipline AND technology (Mishra & Koehler, 2005; Rienties & Townsend, 2012).

Using a semi-structured interview qualitative method with eight teachers from four faculties, Study 2 indicated that overall staff felt that BoB was beneficial in supporting pedagogic practice. In particular, they felt that BoB provided a motivating and engaging alternative to text-based curricula that also had a capacity to enable students to make relevant connections between their learning and the wider everyday contexts in which that learning would ultimately be implemented. The most valuable advantage was deemed to be the ability to store such media indefinitely and securely, without fear that it would disappear or be withdrawn overnight, thus enabling staff to reuse materials in parallel with related teaching and learning resources, year on year. Furthermore, staff highlighted the opportunities for dialogue between theory, real-world scenarios and practice that these video materials offered to students by way of added value.

A key limitation for some (but not all) staff in their use of BoB as a support for video-enriched pedagogic practice was the restricted level of available content on BoB as well as some difficulties relating to service length and skills required for, and stability in use, of clips. Key constraints on effective long-term use of BoB for staff were competing priorities in terms of general

workload and time (Stes, et al., 2011; Ziegenfuss & Lawler, 2008) required to view, review and plan for the inclusion of video materials into teaching and learning. Furthermore, even if staff were able to overcome these initial barriers, some of the facilities in the classroom itself hampered effective usage, as highlighted by one teacher who noted that university infrastructures in the classrooms were not appropriate for showing media streaming activities. Finally, most staff used BoB on a relatively basic (pedagogical and technological) level, primarily as a repository of online materials, rather than actively promoting more collaborative and Web 2.0 functionalities for students to actively discuss, comment and share alternative materials and opinions.

Several reasons may be put forward to explain the lack of engagement amongst some teachers to embrace all the Web 2.0 affordances of BoB. Some argue that the institutional culture may be a limiting factor (Kinchin, 2012a; Kinchin, Lygo-Baker, & Hay, 2008; Rienties, Kaper, et al., 2012). For example, a conscious decision was made to restrict recording and uploading content to ‘teachers-only’ in order to prevent similar meadows of vast but (mostly) irrelevant videos in YouTube. Others argue that teachers are insufficiently trained and equipped with appropriate technological and pedagogical skills (Jimoyiannis & Komis, 2007; Lawless & Pellegrino, 2007; Mishra & Koehler, 2006; Rienties & Townsend, 2012). Although specific workshops and training manuals are provided, and most staff interviewed indicated that BoB was easy to use, creating an awareness and understanding of the complexities of integrating pedagogy and technology within a discipline probably requires a more substantial investment by both teachers and university (Kinchin, 2012a, 2012b; Mishra & Koehler, 2005; Rienties, et al., 2011). Finally, the almost infinite possibilities and affordances of modern VLE systems and BoB and YouTube in particular may be overwhelming and deter teachers in effectively engaging with technology. For many this is caused through anxiety or negative attitudes towards technology that occur through uncertainty (Jimoyiannis & Komis, 2007).

Future research and implications for practice

This research focused on staff; it would be valuable to conduct additional research on how students perceived and used BoB, whether the design choices and implementations made by the teachers were actually leading to improved learning of students, and whether students actually found it easy to watch streaming videos on BoB using smart-phones. As found by our own research (Clark, et al., 2009; Giesbers, Rienties, Tempelaar, & Gijssels, 2012; Rienties, Giesbers, et al., 2012; Tempelaar, et al., 2012) and others (Kinchin, 2012a; Kinchin, et al., 2008; Mishra & Koehler, 2005), the pedagogical design-decisions by teachers are not always understood and interpreted in exactly the same manner by students. For example, in an online economics course using discussion forum tools, Rienties et al. (2012) found that a small increase in the scaffolding learning process in order to stimulate more balanced discussions had a substantial negative impact how students shared knowledge and expertise in an online team setting. In follow-up research, Giesbers et al. (2012) redesigned the online economics course by allowing students to interact synchronously with each other and the teacher using online videoconferencing. Giesbers et al. (2012) found that students using a rich online videoconferencing tools in comparison to using “simple” discussion forums were more satisfied about the instructional support, but to our surprise were less satisfied about the self-determination of their actions and the assessment strategy. In a study amongst 700+ students using a mathematics program, Tempelaar et al. (2012) found that emotional factors (i.e. anxiety, boredom) strongly influenced whether students were active users of the online system or not. Therefore, future research should address whether the design decisions made by the institute and teachers in particular actually led to increased learning amongst students.

Most of the literature (Bloom & Johnston, 2010; Duffy, 2008; Kaufman & Mohan, 2009; Smart, 2010) available on the use of media-streaming and YouTube in particular is (extremely) positive about the affordances and potentials of media-streaming for learning and teaching. However, most of this literature appears to be primarily descriptive in nature. More studies are required which

apply greater scientific rigor. Although we acknowledge that media-streaming services such as YouTube provide an enormous wealth of information, we agree with the notion of “dichotomous nature of YouTube” introduced by Jones and Cuthrell (2011) in that teachers can find excellent videos on psychology or engineering experiments alongside inappropriate videos. Therefore, we encourage further (evidence-based) research on how teachers and students alike are using media-streaming technology. In particular given recent findings by Luppicini (2007) and Tempelaar et al. (2012), it is important to understand how personal characteristics of learners influence how learners with different learning strategies engage with media-streaming technology. Therefore, in a follow-up study we intend to conduct a study on how learning styles influences usages of BoB by students in order to further fine-tune the configuration of BoB. Furthermore, in line with recommendations by Mishra and Koehler (2005), it is important to focus research on how teachers can develop both technological as well as pedagogical knowledge in order to effectively implement media-streaming into their module design. Preliminary findings from research conducted in a Dutch online teacher professionalization program (Rienties, et al., 2011) as well as a Belgium blended teacher program (Stes, et al., 2011) seem to indicate that designing effective ICT training services is complex.

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