Lecture capture at Loughborough: addressing the concerns

Background

The ReVIEW lecture capture service was first piloted at Lougborough in Semester 1 2009/10. Since then, the service has expanded greatly in terms of room coverage and usage. In 2013/14 a total of 1637 sessions were recorded over 78 rooms across campus. In both Semester 1 and Semester 2 the system was used in over 100 modules.

Over the last few years, particularly in the last 12 months, policy and strategy around the use of lecture capture at Loughborough have been much debated in various forums including Learning and Teaching Committee. A growing number of students are requesting the greater use of lecture capture and these requests are being channelled through the LSU Executive. In addition, an increasing number of peer institutions have moved or are about to move to widespread use of lecture capture, where adoption becomes the default at Faculty or even institutional level. This group includes Newcastle, Essex, Aston, UCL, Leeds, Bristol, Cardiff and Imperial. At Newcastle, 30,000 teaching sessions were captured and published to students via the VLE last year.

It is clear from the survey of academic staff conducted earlier this calendar year by Dr Janette Matthews on behalf of the Centre for Academic Practice that many staff, especially those who have not used ReVIEW, continue to have concerns about lecture capture. Whilst some of the concerns that emerge from the survey are essentially misconceptions, many are well-founded. All need to be addressed if a greater number of staff are to be willing to explore the use of the system and to assess for themselves whether the capturing of lectures, where appropriate, makes a positive contribution to teaching and learning. The main concerns, and the responses to them, are outlined below, together with other issues which may not necessarily be obvious to end-users (for instance, relating to the back-end system). See also the 'ReVIEW Frequently Asked Questions' document prepared for staff users.

Dr Matthews also undertook a review of the lecture capture research literature from which key findings are summarised in the appendix. Work is continuing on this and a full report will soon be available. The Centre for Academic Practice will be conducting further research into lecture capture at Loughborough over the 14/15 academic year.

Issues around lecture capture:

1) *Intellectual Property Rights (IPR)*

a. *Ownership of captured lectures*

The Academic Conditions of Service are now clear that copyright in captured lectures belongs to the institution (except where they have been delivered by an external guest lecturer).

b. *Performance rights*

Individual staff retain *performance rights* in captured lectures. This means that anyone can decline to be captured, or ask for a captured session to be withdrawn / deleted, at any time.

c. *Use in performance management*

Some staff have expressed a concern that captured lectures will be used in performance management and the PDR process. This is not the intention unless staff choose to use the material themselves.

d. *3rd party copyright*

The liberalising changes made in June 2014 to UK copyright law as it affects education mean that concerns about 3rd party copyright should no longer be a barrier to the take-up of lecture capture. According to JiscLegal:

Section 32 CDPA [covering fair dealing] now covers all works and copying is no longer restricted to being done by hand therefore there is no reason lecture capture technology cannot be used to record a lecture which includes third party material provided the original work is sufficiently acknowledged and the recording is fair.

In order to be fair the material must be included in the lecture and the lecture recorded to illustrate a teaching point. Only so much of the copyright work can be used as is necessary for illustration for instruction and the use must not adversely affect the rightsholder's ability to exploit their work. Providing access to the recorded lecture via a password protected VLE only to those students and staff requiring access for the purpose of instruction is more likely to be fair than a recording made available openly online.

http://www.jisclegal.ac.uk/ManageContent/ViewDetail/ID/3596/Questions-and-Answers--Copyright-Changes-2014.aspx#_Toc391026509

In summary, for third party resources to be incorporated into captured lectures under ‘fair dealing’,

- Use should be for illustration for instruction;
- Copying should not impact negatively on the market for the original materials;
- Use should be fair and the amount copied reasonable and appropriate.

Having the material accessible via a password protected site such as Learn is one way to illustrate that use is fair.

e. Unintentional recording of students

All rooms where lecture capture routinely takes place will shortly have signs displayed prominently advising that teaching sessions in these rooms may be recorded. In the first lecture of a module, staff will be advised to inform students that (depending on the size and the acoustics of the room) if they speak when sitting near the front of the room, their voice may be heard in the captured lecture. This is sufficient as long as their contributions are incidental to the main focus of the recording. Where student presentations are recorded (via ReVIEW or other means), written consent is required.

At the beginning or end of a lecture, if a student comes up to the podium and asks a personal question, staff are advised to mute the microphone. If a sensitive conversation is inadvertently captured, this should be edited out. Editing can be done for staff on request to review@lboro.ac.uk or they may do it themselves.

f. Unauthorised sharing of recordings by students

Under Section 5 of the IT Acceptable Use Policy, it is clear that such behaviour is a disciplinary matter. http://www.lboro.ac.uk/services/it/about/policies/aup/

There is no reason why the introduction of lecture capture to a module should make it more likely that a student will do this. It would be much easier for a student to distribute a clip if s/he has used a smartphone or tablet to record the lecture covertly.

2) Technical matters

a. Audio + slides or video + slides?

Some early adopter institutions (notably Newcastle with their ReCAP service) opted for the recording of audio and presentation on the grounds that it removed a barrier to take-up. Some of the objections to lecture capture may be reduced to a reluctance to be videoed.

There are different views among ReVIEW users as to the value of the video component in a recorded lecture, with some lecturers (and students) feeling that it helps to personalise the material, and also to make it clear that it was recorded live and not at the lecturer's desk. Others feel that it contributes little, or even that it may be a distraction.

For the extended pilot, it is proposed that the default setting should be audio and slides only. Staff will need to advise Teaching Support before the first lecture if they wish to be recorded on video as well as audio.

Where video is recorded, as has been the case with over 90% of captures at Loughborough, some staff are concerned about stepping 'out of the frame' ie off camera. Most teaching rooms have a fixed camera angle, and this was a deliberate design decision when we started out with ReVIEW, because we felt it was important to minimise complexity – and adding presenter control of the camera position arguably represented unnecessary complexity, as well as significantly increasing the cost of the AV installation.

Over the last two years we have tested in 3 rooms a setup which gives the presenter the choice of 3 camera angles controlled from the podium console. This has had some success. In Semester 1 we will be testing a system which enables automatic tracking of the presenter, so that he/she always remains in the frame. We will report back on whether the cost / benefit ratio justifies its inclusion in the standard ReVIEW installation specifications for newbuild / refurbishment.

b. Fixed installations vs software-only installations

There are two variants of Echo 360, the proprietary system underpinning ReVIEW: software capture and hardware 'capture appliances'. The latter are currently installed in around 25 teaching room podiums and offer superior quality and ease of use for the capture of lectures. The software variant is cheaper and can be installed on personal desktops / laptops or on podium PCs. In the case of the latter, it has worked well over the last year and is fit for purpose but adds a modest (but we believe acceptable) level of complication for presenters using visualisers, as many now do. Some Echo 360 institutions, such as UCL, only use hardware capture in teaching rooms for this reason.

c. Processing time

Last academic year (particularly Semester 1) there were issues with delays in the automatic processing of captured lectures. This was caused by (a) a bug in the back-end software which prevented it from making full use of the processing power available to it; and (b) a need for further 'virtual processors' to be added to the system allowing more captures to be processed simultaneously. This issue was resolved in Semester 2 13/14 and, as ReVIEW usage increases, we do not envisage any problems in this area.

d. Publication of captures

Over the last year, almost all captured lectures have been published automatically to the appropriate Learn module page via the so-called EchoCenter block. This requires no intervention from the module tutor or from ReVIEW support. Module tutors have found this to be very convenient, especially when compared to the previous process which required the link to each lecture to be copied and pasted into Learn post hoc. From the perspective of students it is convenient too because all captures associated with a module are located in the same place. Additionally, it provides the module tutor with detailed information on how the lecture is being viewed.

However, some staff may be concerned about immediate publication and prefer to have a delay. In these circumstances, publication could be initiated by either the module tutor or the ReVIEW support technician within Teaching Support.

e. Reliability

The system itself has mostly been very reliable since it was introduced in 2009, particularly the hardware installations. Issues have mainly been due to user error (radio mic switched off; the wrong scheduling details entered) or connected with the software capture version. User error can be minimised through the increased availability of support from the ReVIEW support technician role and by 'engineering out failure'. There are numerous ways in which we have tried to do this, eg by fitting podiums with monitors with built-in webcams, which has helped to ensure that the camera is pointing in the right direction.

f. Archiving policy

The storage capacity available to ReView is finite and an explicit policy on archiving of captures is under consideration. Currently, every capture recorded to date is still on the system but this is not sustainable, particularly as usage scales up. It is proposed that the archiving policy be in line with modules on Learn (6 years). This will be discussed at Learning and Teaching Committee. Staff can request the removal of their material from the archive at any time.

g. Further automation of back-end system

Further automation of the population of the Echo System from LUSI (tutors and modules) and of the link between the Echo System and the timetable system would be possible and desirable but has not yet been prioritised. This has little impact currently on end-users but would help with the scaling-up of the service.

h. Choice of system

We have been using Echo 360 since September 2008. At intervals we have reviewed the main alternatives (Panopto; Matterhorn; Camtasia Relay) but there has not (to date) been a compelling case for switching.

3) Pedagogic concerns

a. Re-use policy

Currently we do not have a policy regarding re-use of captured lectures. Newcastle has a policy which prevents the use of captured lectures outside the cohort to which they were delivered. At Loughborough this appears to happen rarely and a policy will be developed to clarify the position.

b. Attendance

There is limited evidence at Loughborough and in the literature that the use of lecture capture has a negative impact on attendance. The direct nature of the link is difficult to establish as attendance can vary across a module for a variety of reasons.

c. Will it get in the way?

The ReVIEW system, whether it is a hardware capture appliance or software capture running on the podium PC, runs unobtrusively in the background. At Loughborough, almost all lecture recordings are scheduled on behalf of the lecturer, and the recording starts automatically. This is by contrast with Nottingham where all captures (as a matter of policy) have to be initiated in the teaching room by the presenter.

d. Is it effective? In what circumstances?

A review of the lecture capture literature was undertaken by Dr Janette Matthews on behalf of the Centre for Academic Practice. A summary of the key findings is included in the appendix.

e. Will lecture capture be used as a way of cutting down on contact time / the numbers of academic staff?

The use of lecture capture is intended to contribute to enhancing student learning and engagement. It is not a substitute for face-to-face interaction or the employment of staff.

4) Support for staff

a. Before teaching

With the exception of several MSc programmes in CREST and Materials, all captures are scheduled on the Echo System by Teaching Support or sometimes the Centre for Academic Practice. It is possible for staff to initiate captures themselves on an ad hoc basis but we have chosen not to promote this as it introduces another point of failure.

Support is available to staff before they start teaching in the form of familiarisation sessions in the teaching room provided by Teaching Support; an FAQ document; online materials; and scheduled central CPD workshops. A group of 10 lecture capture 'mentors' was formed from experienced academic colleagues using ReVIEW last year and it is hoped they will continue to provide advice on request next year.

b. In the teaching room

The ReVIEW support provided routinely by Teaching Support technicians in the teaching room was much praised by respondents to the staff ReVIEW survey earlier this year.

It is important that staff should be familiar with the AV setup of a room before teaching starts because this helps reduce any anxiety associated with being recorded.

Signs will be put up in all teaching rooms where the ReVIEW service is available advising staff and students that this is the case. A laminated ReVIEW guide will also be provided.

Active monitoring of the system (see below) is important to ensure that any technicial issues in the teaching room can be resolved as soon as possible.

c. Editing

Some respondents to the survey earlier this year reported that they might have edited their captured lectures but did not know how, or whom to ask.

Editing of individual captures is done for staff on request to review@lboro.ac.uk) or they can do it themselves. CPD workshops covering editing and other more advanced features will be available throughout the coming year.

In general, we advise staff not to edit captured lectures unless it is essential (for instance, because a sensitive conversation with a student has been recorded). Most regular ReVIEW presenters have come to the view that the system makes it so easy for students to navigate to the relevant sections that editing out the sections where the audience was arriving or departing is unnecessary work. We know that students

only expect captured lectures to be ‘fit for purpose’ – not professionally shot and edited documentaries.

d. Monitoring

In the first few years of the ReVIEW service, when the number of captures each week was low, the task of monitoring captures for technical issues (and responding to these as appropriate) was straightforward. However, the task has become more difficult over the last year with over 1600 captures. This will be one of the most important duties of the new ReVIEW support technician in Teaching Support, and will help avoid the situation which arose occasionally last year where all captures in a particular room were affected by a technical issue over several days without anyone (including staff and students) noticing.

Appendix: Summary of key findings from literature review

A review of the lecture capture research literature has been conducted by Dr Janette Matthews on behalf of the Centre for Academic Practice. The full review will be presented to Learning and Teaching Committee. Below is a summary of the key findings, some of which appear to be contradictory as might be expected.

Reference	Content	Comment
A Comparison of the Usage of Tablet PC, Lecture Capture, and Online Homework in an Introductory Chemistry Course Kevin D. Revell *Journal of Chemical Education* **2014** *91* (1), 48-51	Authors compare three technologies (a tablet PC, lecture capture and replay, and an online homework program) in a large introductory chemistry class (144 students) in 2013 (USA). Number and duration of student viewing of LC were tracked. There was an attitudinal survey which included questions on use of LC replay. LC used by about 40% of students and most extensively by English second language (ESL) and international students. There was also heavy use (>10hours) by native English speakers. Heavy use (>10h) and most moderate users (2-10h) achieved B-C grades. LC may have contributed to successful completion of course. LC was used most commonly to review a concept the student did not understand or to watch a class the student had not attended. Hints, suggestions and immediacy were most important features. All three tools led to student success. Preferred learning tools differ from student to student.	LC contribution to retention
Shaw, G. P. and Molnar, D. (2011), **Non-native english language speakers benefit most from the use of lecture capture in medical school.** Biochem. Mol. Biol. Educ., 39: 416–420. doi: 10.1002/bmb.20552	Student performance in an inaugural lecture capture-supported biochemistry course in the US (60 students 2009) was compared to that in the previous academic year (2008). The use of lecture capture-supported pedagogy resulted in significantly higher student test scores, than achieved historically using traditional pedagogy. The overall course performance using this lecture capture-supported pedagogy was almost 6% higher than in the previous year. Non-native English language speakers benefitted more significantly from the lecture capture-supported pedagogy than native English language speakers, since their	LC positive impact for non-native English speakers and international students

	performance improved by 10.0 points.	
An analysis of lecture video utilization in undergraduate medical education: associations with performance in the courses John A McNulty, Amy Hoyt, Gregory Gruener, Arcot Chandrasekhar, Baltazar Espiritu, Ron Price Jr and Ross Naheedy, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647683/pdf/1472-6920-9-6.pdf,	Streaming videos of lectures (n = 149) to first year and second year US medical students (n = 284) were made available through a password-protected server. Server logs were analyzed over a 10-week period for both classes. For each lecture, the logs recorded time and location from which students accessed the file. A survey was administered at the end of the courses to obtain additional information about student use of the videos. Results: Wide disparity in the level of use of lecture videos by medical students with the majority of students accessing the lecture videos sparingly (60% of the students viewed less than 10% of the available videos. The anonymous student survey revealed that students tended to view the videos by themselves from home during weekends and prior to exams. Students who accessed lecture videos more frequently had significantly ($p < 0.002$) lower exam scores. M2 viewed more than M1. Average grades in the courses were not statistically different from the prior year when lecture videos were not available. Attendance was not influenced by availability of LC. Conclusion: Significant use of lecture videos in the medical curriculum was limited to a relatively small percentage of students, who tended to view videos by themselves to fill in notes and review. Attendance at lectures did not seem to be significantly affected. The frequency with which individual students viewed videos was inversely associated with their grades in the courses. Videos of lectures are used by relatively few medical students and that individual use of videos is associated with the degree to which students are having difficulty with the subject matter.	LC did not affect attendance. Relatively low use of LC Possible higher usage amongst those experience issues.

	Large number of students elected not to participate in survey so study does not reveal student use of LC. Study raised question of whether LC videos can be used for faculty development.	
Lecture capture in large undergraduate classes: Student perceptions and academic performance Ron Owston, Denys Lupshenyuk , Herb Wideman , The Internet and Higher Education Volume 14, Issue 4, September 2011, Pages 262–268 DOI: 10.1016/j.iheduc.2011.05.006	Study to understand the relationship between student perceptions of lecture capture and academic performance in large undergraduate courses. Five courses (n=439), Canada, self reporting survey and final grades. To address the above unresolved issues, the following research questions about lecture captured were formulated for this study: 1. What is the relationship between student physical attendance and final course grades when complete recordings are available for all lectures? 2. What is the relationship between frequency of access of lecture recordings and grades? 3. What is the relationship between viewing patterns and grades? 4. What is the relationship between in-class behavior during lectures and grades? 5.What is the relationship between students' preferences for viewing the instructor in videos and grades? Attendance slightly less, some stop entirely (high achievers). Students who accessed recordings less achieved higher grades. Lower achievers watch recordings multiple times. LC makes little difference to in-class behavior in large classes – does not free up students from note-taking. Students would prefer to see instructor on video – no suggested difference in retention of grades.	LC is of more benefit to lower achieving students. LC does not affect attendance or in-class behavior. LC can be ignored if not of benefit

	Results suggest higher achieving students view recordings significantly less often than low achievers. High achievers attended class less often, fast forward and view certain sections of recordings only once. Low achievers view the entire recording multiple times. The conclusion is that lecture capture is more likely to be of benefit to low achieving students. Further research is needed • to examine the question of who benefits most from lecture recordings and why they benefit. • to investigate the differences in lecture capture usage among students of different achievement levels. •	
Evaluating the use and impact of lecture recording in undergraduates: Evidence for distinct approaches by different groups of students Computers & Education **Volume 61, February 2013, Pages 185–192** Wendy Leadbeater, Tom Shuttleworth, John Couperthwaite, Karl P. Nightingale DOI: 10.1016/j.compedu.2012.09.011	Detailed study of supplementary lecture recording in UK HE. Survey and online monitoring. Lecture recordings are widely accessed, and generally used in a 'targeted' manner. Dyslexic students rely heavily on lecture recordings. Lecture recordings do not appear to impact on users exam performance. Multi-year study (2010/11 n=69 and 2011/12 n=71) with UK undergraduate, year 2 Medical Science students Fifth of cohort had problem with notetaking. Half cohort use LC to support learning. Students use Recordings in a targeted way – smaller sections (43%), whole lectures 33%, repeat and pause. Some to catch up on whole missed lectures. Lecture attendance declined by 5%. Peaks after lectures and prior to exams. Two groups – very low use and very high use – very reliant on LC	Students adopt targeted approach to LC. Generally 50% accessed, could rise to 74% for specific lecture LC facilitates notetaking. 20% have problems. High users group (5%) includes large numbers of dyslexic and non-English speaking background students. LC positive for majority. Some attendance reduction. LC may encourage surface learning in a minority if

	(includes high numbers of dyslexic and non-english speaking background). No discernable impact on exam grades.	students.
Digital lecture recording: A cautionary tale Amy N.B. Johnston, Helen Massa, Thomas H.J. Burne Nurse Education in Practice Volume 13, Issue 1, January 2013, Pages 40–47 DOI: 10.1016/j.nepr.2012.07.004	Two groups of nursing students undertaking their first anatomy and physiology course - one group was also provided access to streaming of recorded copies of the live lectures and the other not. Two different campuses. Summative and formative assessment. Courses difficult – high failure rates. Most students accessed LC – majority appeared to be viewing LC. Although attendance dropped, students felt LC could not replace live lectures. Peaks around assessment. LC used to cover material at own pace.	Students responded positively to LC. Attendance reduced in LC group. Academic performance reduced in LC group. Possibility LC encourages cramming as opposed to ongoing engagement. LC can help support students struggling with terminology, pronunciation, difficult concepts reviewing materials. Needs to be integrated in a way which encourages consistent effort and engagement.
Student and Faculty Member Perspectives on Lecture Capture in Pharmacy Education American Journal of Pharmaceutical Education 2014; 78 (4) Article 74. Jon-Paul Marchand, MEd, Marion L. Pearson, MA, and Simon P. Albon, MSc	Canadian study with Pharmacy studentsStudents using LC to re-inforce learning – all times. Year 1 individual accesses high, short time – novelty. Year 2 individual accesses 42% lower, viewing time 13% longer – more selective use of LC. Faculty reported little change in student behaviour in class and note takeing. Students felt were more engaged and note taking improved. Student reported little change in attendance, faculty 20% down.	Students and instructors think LC a valuable resource. Students used LC but did not rely on it exclusively. Faculty passive in their use. Students report better engagement and no drop in attendance. Faculty report drop

	Both felt LC enhanced learning. Effect on grades not studied but faculty saw no difference in grade averages.	in attendance and no change in engagement. Use will be continued.
Is the effectiveness of lecture capture related to teaching approach or content type? Computers & Education Volume 72, March 2014, Pages 121–131 Jared Danielson, Vanessa Preast, Holly Bender, Lesya Hassall,	Purpose of two related studies was to explore the relationships between course characteristics (teaching approach, content type, and level of curricular coordination), lecture-capture implementation, and learning in a veterinary medical education environment. Study 1 – 22 students, 35 faculty: perception of LC and impact on learning Study 2 – 491 students: comparison of test scors on groups experience LC Cited studies were all conducted in the United States, Great Britain, Canada or Australia, and occurred in a variety of disciplines including medicine, physics, business, engineering and genetics. Research questions 1. What is the relationship between instructor teaching approach and the attitudes that instructors and students have toward lecture capture? (First study) 2. What is the relationship between curricular coordination and the attitudes that instructors and students have toward lecture capture? (First study) 3. What is the relationship between course content type and the attitudes that instructors and students have toward lecture capture? (First study) 4. What is the relationship between use of lecture capture and	In general terms, we identified a mixture of outcomes, with some studies reporting no clear relationship between lecture-capture use and learning, some reporting a mixed or negative relationship, and some reporting a positive relationship. Regardless of findings from objective learning outcomes measures, students themselves tend to believe overwhelmingly that having access to captured lectures helps learning. Neither learning outcomes nor student perception seemed to vary systematically by discipline or by the country in which the study was conducted, though a systematic exploration of those factors was beyond the scope of the present study. Study supports the idea that access to lecture capture can improve student learning

	learning? (Second study)	outcomes, and certainly that captured lectures can be made available without endangering learning outcomes.
Modelling and quantifying the behaviours of students in lecture capture environments Computers & Education Volume 75, June 2014, Pages 282–292 Christopher Brooks, Graham Erickson , Jim Greer, Carl Gutwin	Study considers not just the broad effect of lecture capture technology on academic achievement between cohorts, but whether this effect is related to patterns of viewership among learners. While there are a number of interesting educational issues with respect to lecture capture technology, such as student motivation, classroom attendance, and pedagogical techniques, this work focuses on the issue of whether there are patterns of viewership of recorded lectures and, if so, how these patterns correlate with academic performance. The end goal of this line of research is to determine both good and bad uses of lecture capture technology, in order to encourage students to use it appropriately. 3 second years US science cohorts.	Develops a model for student use of LC Shows that there exists a significant positive correlation between academic performance and usage of lecture capture tools.
Steve Bond & Sonja Grussendorf **Staff attitudes to lecture capture** LSE Research Online: December 2013http://eprints.lse.ac.uk/54870/	LSE study REVISIT	Study considers persepectives of staff, role of the lecture
Lecture capture in engineering classes: bridging gaps and enhancing learning Nashash, Hasan Al ; Gunn, Cindy Educational Technology & Society, Jan, 2013, Vol.16(1), p.69(10)	This paper explores the use of lecture capture in Engineering classes to provide students with the opportunity to enhance their understanding of the course content. Students were asked to provide feedback on what they perceive the benefits and the drawbacks of lecture capture to be. The results show that the students consider lecture capture an effective tool to help them succeed in the course. The videos are available to them 24 hours a day, seven days a week thus allowing students to bridge the gap between what they have understood in the formal class setting and what they are able to	

	better understand after reviewing the videos in a more informal, relaxed environment. In addition, most of the students indicated that the availability of the videos did not encourage them to skip or miss any classes. The main drawback was associated with technical difficulties which resulted in some wasted time.	
Impact of online lecture-capture on student outcomes in a therapeutics course. Bollmeier, Suzanne G. ; Wenger, Philip J. ; Forinash, Alicia B. American Journal of Pharmaceutical Education, Sept, 2010, Vol.74(7)	Objectives. To examine the correlation between students accessing recorded lecture files (audio and slides) online and course grades and class attendance. Methods. Second professional year (of 6-year program) students in a therapeutics course had access to recorded online lectures for 72 hours following live lectures. The number and duration of lecture accessions were compared to final course grades and class attendance. Course grades were compared to those of a historical control group. At the end of the semester, students completed a brief survey instrument regarding their use and perceptions of online lectures. Results. No correlation was found between final course grades and the number of lecture accessions ($r = 0.0014$) or total number of minutes lectures were viewed ($r = 0.033$), nor between class attendance and minutes viewed ($r = 0.2158$). Students with access to recorded lectures outperformed the historical control group on the final examination ($p < 0.002$). Seventy-two percent of students reported no influence of online files on class attendance. Conclusions. Posting lectures online did not affect student outcomes, but students did score higher on the final examination.	
Use of Lecture Capture in Higher Education - Lessons from the Trenches Newton, Genevieve ; Tucker, Trent ; Dawson, John ; Currie, Elliott TechTrends, 2014, Vol.58(2), pp.32-45	Lecture capture, defined here as the capturing of some or all elements of a live lecture in digital format, is becoming increasingly popular in higher education. Despite this increase in popularity, fewer than 10% of institutes of higher education globally have adopted comprehensive lecture capture systems. So, the majority of instructors wanting to use lecture capture technology will find themselves having to acquire their own technology and do the capture themselves. There are several factors that influence the use	

	of lecture capture, including the instructor's level of comfort with technology, their budget, and the context in which they will be using the tool. Using case studies of our own experiences, we hope to illustrate a variety of ways in which lecture capture can be appropriately used in higher education in this way. Following this, we outline several challenges that we faced and provide recommendations for how to overcome these. Lastly, we describe some issues that should be considered and addressed before getting started using lecture capture technology in a way that is customized to suit the needs of both professor and student. We hope that by following the guidelines outlined in this paper, and by seeing practical examples of how lecture capture can be used in a variety of contexts, the transition from idea to implementation will be an easier one.	
Lecture capture: rich and strange, or a dark art? Secker, Jane ; Bond, Steve ; Grussendorf, Sonja 2010 London School of Economics and Political Science	Existing research indicates that staff attitudes towards this technology are polarised, with some seeing the immediate value to students as a tool for revision and to help those whose first language is not English, while others are more skeptical, citing concerns about intellectual property and academic freedom. There are also common concerns about the impact of lecture capture on attendance at lectures (Davis et al. 2009; Chang 2007). Student attitudes towards the system, however, are very largely positive (Veeramani & Bradley 2008; Von Konsky et al. 2009). This literature review was conducted to support a presentation at the ALT-C 2010 conference at the University of Nottingham.	
Recording tutorials to increase student use and incorporating demonstrations to engage live participants.(organic chemistry tutorials at McGill University)(Guest commentary) Hudson, Reuben ; Luska, Kylie L.	How the application of lecture capture technology has guided the development of introductory organic chemistry tutorials at McGill University is discussed. Tutorial formats involve non-recorded chalk talk and recordings with incorporated demonstrations, discussions, and opportunities for active learning. Implications on student use and student performance are highlighted.	

Recording tutorials to increase student use and incorporating demonstrations to engage live participants.(organic chemistry tutorials at McGill University)(Guest commentary) Hudson, Reuben ; Luska, Kylie L. Journal of Chemical Education, May, 2013, Vol.90(5), p.527-530	How the application of lecture capture technology has guided the development of introductory organic chemistry tutorials at McGill University is discussed. Tutorial formats involve non-recorded chalk talk and recordings with incorporated demonstrations, discussions, and opportunities for active learning. Implications on student use and student performance are highlighted.	
Arun Karnad **Student use of Recorded Lectures** 2013 London School of Economics and Political Science	http://eprints.lse.ac.uk/50929/1/Karnad_Student_use_recorded_2013_author.pdf A report reviewing recent research into the use of lecture capture technology in higher education, and its impact on teaching methods and attendance. REVISIT	Students like access to LC Students use LC to prepare for assessement and to make up for missed lectures. Students prefer access to live lectures Students are helpful for NSEB students and students with disabilities