Lecture Capture: Student Hopes, Instructor Fears

Ben Williams
Jeffrey Pfeifer
Psychological Science and Statistics, Faculty of Life and Social Sciences
Swinburne University of Technology
Vivienne Waller
Swinburne Institute for Social Research

Technology to capture and retransmit lectures has been widely available for more than two decades. However, the widespread expectation that universities will record all lectures is not matched by systematic research and theory on lecture capture use. This paper provides a brief overview of research and reports a three-phase study of lecture video use and perceptions carried out with the staff and students of an undergraduate psychology program at a large suburban university. We found that some lecturers are concerned that mandatory lecture capture creates copyright problems and reduces their ability to provide their best teaching. There is also evidence that lecture capture decreases attendance and lowers grades for some students. However, our results indicate that for students enrolled in face-to-face units, the availability of captured lecture videos offers a valuable revision tool which is integrated into "traditional" study patterns rather than replacing them.

Keywords: lecture video; lecture capture; mixed-methods.

Background

Lecture capture (LC) technology - hardware and software which can record live lectures for retransmission in multiple (usually digital) formats - has been widely available for several decades. The most widespread application is probably capturing face-to-face lectures to supplement students' lecture experience or provide flexible study options for students who are not be able to regularly attend classes. Such recordings may also be "recycled", or more polished studio-made recordings produced, to completely replace live lectures. In some cases this may be a cost-saving measure, or a means of accommodating staff absences. In completely online courses video is the only feasible method of delivering something approximating a traditional lecture. Some completely online course deliveries (e.g., Coursera http://www.coursera.org) make use of multiple short videos (typically only 10 minutes long each) to provide students with an introduction to content that would traditionally be covered in a lecture or assigned reading. Other online offerings, such as Swinburne University of Technology's (2013) psychology units offered through Open Universities Australia, use video overviews or "bookends" to outline the structure and introduce key topics to be covered in the readings and learning activities. We can also imagine blended designs where the videos may be intended as preparatory material, and the hours of face-to-face teaching they would have occupied are replaced by other non-lecture teaching activities such as laboratories, tutorials, and workshops.

It is important to recognise that we cannot make blanket statements about "lecture videos" – for example short podcast and full length lecture captures are perceived and used very different by students and recommendation regarding one do not generally apply to the other. For example in a study by van Zanten, Somogyi, and Curro (2012) found that while students value full length lectures as much as short podcast they made much more use of short (~5 minute) podcasts. In this paper we discuss videos captured from live lecture offered in addition to face-to-face lectures or as a substitute for missed lectures. This is a specific pattern of use which is both

widespread, and is likely to be a point of increasing focus in the near future as higher education institutions respond market demands for learning resources or transition to blended teaching methods which do not involve large group lectures. Unless otherwise stated, this somewhat narrow definition is what we mean when we use the term lecture capture or lecture video. Most technologies come at some cost, the full extent of which is not always recognized (Laurillard, 2007a) and frequently not thought about how they work (Laurillard, 2007b). Aside from financial considerations lecturers express concerns that LC is eroding the quality and freedom of their teaching and attribute lower attendance rates to it. The trend of offering students LC as an additional learning supplement opportunities is part of a bigger international trend towards increased technological initiatives (see, for example, Concannon, Flynn, & Campbell, 2005) the effects of which on educational outcomes are yet to be fully realised.

In Australia LC for on-campus units is fast becoming a de facto standard and is expected by most students. While major universities have often recognised that LC should or has available at instructor's discretion used with due consideration of pedagogical and copyright issues (University of Melbourne, 2013), some student unions have petitioned for LC policies mandating the recording of all lectures (e.g., La Trobe Student Union, n.d.) and won them (La Trobe University, 2012; University of Melbourne Student Union, 2013).

With increased demand for flexible learning programs there is pressure to put lecture content online, but should we do so just because we can? It is clear that for students studying in distance modes, LC or purpose-made videos are the only real alternatives to face to face lectures, but it remains an open question that many instructors are asking as to whether offering LC as an option for face-to-face students or entirely replacing lectures with recordings is a good idea. Over four decades ago, in his discussion on the use of broadcast video for supplanting live lectures McConnell (1968) remarked on the lack of principled evaluation of the effectiveness of teaching techniques and technologies. What has changed in nearly half century? Putting the terms "lecture," "video", and "podcast" into EBSCOHost searching title, keywords, abstract and subject returned more than 7,000 hits at time of writing. Narrowing these to peer reviewed publications reduces this to about 2,500 and adding the subject area "higher education" reduces this to 202. Other filters can be applied that reduce or increase this number, but this is a sufficient sample to make a few points. By most standards this is not an inconsiderable amount of research, nor is it large. Limitations of this search are considered in the discussion.

What is the substantive content of this body of work? It is beyond the scope of this paper to do a thorough review, but we can paint a picture of what researchers have done. We attempted to summarise the themes of these papers and ended up developing 6 distinct and 3 somewhat overlapping categories which captured the main themes of the papers (categories are italicised in the remainder of this paragraph). Just over 30% were *irrelevant* – they contained the search terms, but were not actually about lecture videos (e.g., the paper was about using TV and film clips in lectures). About 5% concerned live *teleconferencing* (video technology used in live lectures). About 20% were *theory and review* papers or described the *development of courseware* (which included lecture/video content), and just under 15% described the *development of technologies* related to lecture videos (e.g., software to time index lecture videos and share these tags on LMSs and social media sites; automatically generating lecture summaries by offline processing of lecture recordings; editing tools). About 1% did not neatly fit any of these categories ("*other*"). Of all the papers found only thirty-point-seven per cent (60 papers) dealt specifically with lecture videos created from or designed to replace live face-to-face lectures. About one third of these dealt solely with student or staff *perceptions of lecture videos or their attitudes* towards them (e.g., liking, reported effects on study habits), with some mentioning motivation and effects on attendance. Just over a third of these dealt primarily with evaluating the *instructional effectiveness* of LC (e.g., the learning outcomes associated with LC alone or in combination with or contrasted against other study opportunities as gauged by quizzes and exams). A little over a third of these papers dealt with both *motivational/attitudinal aspects and instructional effectiveness of LC* in equal measure.

Studies that have measured outcomes with final exams or used quantitative learning measure such as quizzes, provide mixed evidence about the help or harm done by LC. Some have found courses with LC embedded in or as the sole form of instruction lead to better student outcomes (Houts & Taylor, 2008) while other researchers have found face-to-face instruction outperforms online methods even when significant resources are devoted to the online version (Slater & Jones, 2004). Although there are both negative and positive findings the modal finding is that, at the very least, providing LC does not impede student performance (e.g., Crain, 1994; Hudson & Holland, 1992), or the difference arises from the *way* in which students use it (de Boer, Kommers, & de Brock, 2011). Many of the papers we classified as primarily addressing *instructional effectiveness* which found that lecture videos could improve learning did not effectively control for motivational and sampling issues, for example performance gains occurred within experimental groups that had nearly total video-watching compliance or naturalistic studies do not capture the losses associated with disengaged students who failed to

watch the videos.

Recent large-samples studies (e.g., von Konsky, Ivins, & Gribble, 2009) have failed to find any strong association between LC and lecture (non-attendance), but do find LC is used for missed lectures and it is not entirely clear what role the availability of LC has in deciding to skip a lecture, even it is made up later. Despite the lack of association between LC and lecture absence, those who do not miss lectures and those that use LC in addition to lectures tend to gain higher grades. When LC is deployed in a course, there will be a complex interplay between the pedagogical and cognitive factors on the one hand (of themselves are videos capable of fostering good learning outcomes) and affective and motivational factors on the other (e.g., whether people want to use the technology, and whether its availability leads to helpful or unhelpful outcomes, e.g., skipping lectures). Experimental, qualitative, and survey research are required in combination to create optimal learning designs, and the remainder of this paper reports on a three-phase study which attempts to utilize multiple methods in understanding the needs and behaviours of our students.

Method

The setting for this study is a large Victorian university with both inner and outer suburban campuses running a 3-year APAC-accredited undergraduate psychology major. At time of writing the university had LC capabilities in many (but not all) of its medium and large teaching spaces, using *lectopia* to schedule, capture, and mange recordings for units, using blackboard 9 as their LMS. There was no official policy mandating LC use, but student feedback on teaching has regularly indicated that students expect it to be available. The recording is opt-in and must be booked by lecturers, but all undergraduate psychology lectures are taped unless there is a reason not to (e.g., guest speaker, copyright limitations). All lectures in the psychology major are offered twice: once during work hours and once out-of-hours (i.e., after 5:30pm) to provide flexible learning opportunities for students with work and personal commitments.

The study comprised three phases which each focussed on different sources of information. Ethical approval to conduct the research was obtained from the university's human research ethics committee and faculty approval was obtained to approach staff and students for this research.

Phase 1 – Lecture Video Usage Data

The conveners of units were approached before the second semester of 2011, and were asked if they would be willing to have information collected from their units regarding lecture video usage. Conveners from core units at each undergraduate year agreed, and first year introductory psychology, second year cognitive psychology, and third-year social psychology were selected as the foci of this study. The conveners regularly used LC technology by using a central booking service which remotely schedules recordings and automatically makes them available as a Blackboard resource. Conveners were already familiar with how to deploy recording links and podcast feeds on their Blackboard sites, but were given additional instruction on configuring the Blackboard environment to track LC video access. "Click data" - which records the date and time of each unique access of a lecture recording – was tracked over the semester and downloaded at the end of the exam period. It is important to note that a click does not guarantee that the video was viewed in whole or in part, simply that an attempt to access it was successful.

Phase 2 – Focus Groups

Although Phase 1 provided objective information about student accessing of lecture recordings, it was recognised that richer qualitative information regarding student and staff perceptions of LC usage was required. To this end five open-ended focus groups were held, three with students and two with staff. All focus groups were conducted by the same person, an experienced qualitative researcher who asked staff and students to comment on issues related to the use of lecture video software. Groups had a maximum size of 8 persons and typically took an hour.

Phase 3 – Student Survey

The qualitative results of Phase 3 were used to develop a short survey to validate some of the observations from the focus group and obtain a representative sample of students across all year levels to address a few specific LC-related questions, specifically: 1) what are the reasons students access lecture recordings, 2) are there differences in LC use/perception across different year levels, 3) reasons that student do *not* access lecture recordings, and 4) information regarding what faculty might do to increase LC use.

Participants
Fifty-seven students completed the survey. Participants ranged from 18-54 years of age. Fifteen were male (26.3%), the remaining 40 were female (70.2%), two did not give their gender. This age and gender profile is consistent with the enrolment of the undergraduate psychology major.

Materials and Procedure
The survey consisted of 15 multiple option/numeric answer questions assessing demography (gender, age, year level, average grades) and use and perceptions of LC technology (how often and how much LC is used, how useful it is, role in lecture attendance, barriers to use). There were also three open-ended questions asking students to identify the best thing about the technology, what would make it more useful, and a wish list of software features. The survey was delivered using *Opinio* (2013) online survey tool. Students in the selected undergraduate units plus a fourth year/honours psychology unit were invited to participate via announcements placed on the LMS in the final week of classes. Informed consent was obtained, consent indicated by completion of the survey.

Results

Phase 1 – Lecture Video Usage Data
The lecture recording system used (lectopia) has a number recording options. These include: audio only; audio and data projector; audio and lectern (video of the speaker); and audio, lectern, and data projector ("dual capture"). The lectern option is not available in all spaces. The LC system automatically produces all "lowered order" versions of a capture, and at multiple resolutions (different file sizes for download) e.g., if the dual capture option is selected, the audio only, audio+data capture, and audio+video versions are produced as well.

All the teaching staff in the surveyed units used the audio+data capture version, which is the system default. Anecdotally this is the format used by all lecturers in the psychology group. Some remarks regarding this are given in the section of these results describing Phase 2. Each lecture is delivered twice. Only the repeat delivery is recorded, which is available within an hour of the end of the lecture.

The hit data for each unit are presented in plots showing the total number of accesses for each recording across the whole teaching period, the number of accesses for each calendar week of the teaching period aggregated across all recordings (note, students cannot access future recordings!), and the time of day for accesses aggregated across lecture recording and teaching period. Between them these displays give an indication of what topics/lectures students are watching, when in the semester they access them, and how these accesses are timetabled into students' daily lives. Plots and descriptions of the data are given separately for each year level. There were 12 lectures for each unit, the whole teaching period covering 13 weeks with a non-instruction period in the seventh week. The exam and revision period occupies weeks 14 to 16 in these plots.

Lecture Topics Viewed
Figure 1 displays the lecture topic (i.e., lecture delivered in each week of semester). For first years, the first lecture was the most viewed, with almost as many hits as enrolments. Accesses quickly tapered off and trended down to an average of 243, with a bump interrupting the trend in week 6 lecture.
Second years showed a similar, but less pronounced version of this pattern. Owing to a technical glitch the first lecture failed to record. Thirty-one students tried to access it before the link was removed. This underscores the point that hits do not equate to views. After an initial peak in number of views for lectures early in the sequence accesses tapered off to an average of about 99 per week with slight increases in accesses of the week 7 and 11 recordings.
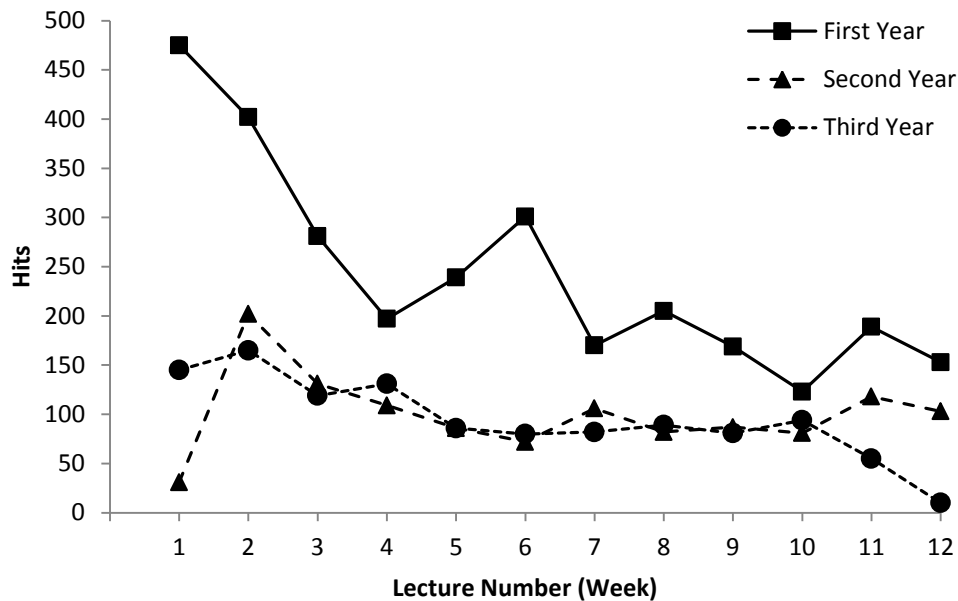
Figure 1: LC download hits per lecture for 1st, 2nd, and 3rd year students. Note that a non-instruction week (not shown) is interposed between lectures 6 and 7.

While there are small differences in some areas, third years showed striking similarities to the first year data. As with first year, the most accessed lectures were the first two, with a small surge in accessed for the lecture that preceded the study break. As with the other two year levels, there was a major trend for accesses by third years to decline for later lectures but a small amount of oscillation around the main trend.

Lecture Access – Timing in Study Period
Figure 2 show the number of hits for each calendar week in the study/exam period. This hit show the aggregate of all lectures topics accessed, e.g., the hits in week 3 include downloads of topics 1, 2, and 3 made in the third week of semester.

For first years, the number if accesses per calendar week oscillated around 175 per week with two pronounced spikes and one moderate dip in accesses. The first and smaller of the two spikes was around weeks 2-3, early in the semester. Following this spike access was fairly stable up to and through the study break. Accesses the dipped in weeks 8 and 9, which coincided with the submission of the major assignment for the unit (end of week 9). Accesses the returned to pre-assignment levels then spiked sharply in weeks 14 and 15, the exam for this unit falling in week 15.
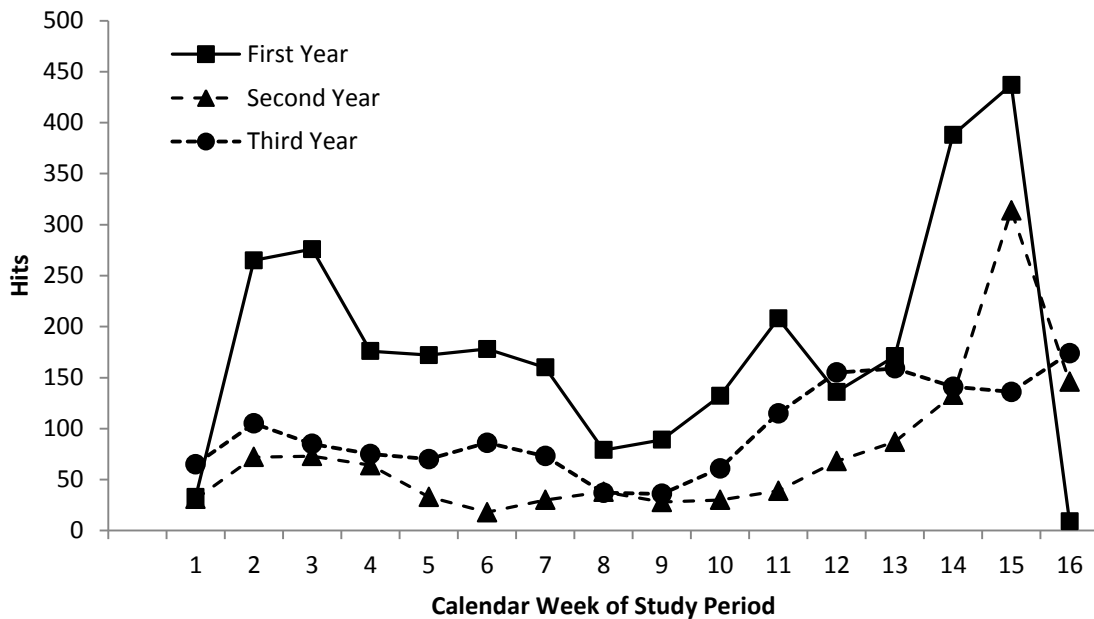
Figure 2: LC download hits for each week of the teaching and exam period for 1st, 2nd, and 3rd year students.

Although second year students had similar week-of-access pattern to first years there are some important qualitative differences. Second years showed the same initial surge in accesses early in the semester, however, this was smaller than the first year surge, possibly due to the failure of the first recording. There is some evidence of a dip in access coinciding with the weeks of assignment submission (week 6 and 9), although this is much less pronounced than the dip at this time in the first year plots. Notable is the enormous spike in accesses during the exam period.

Third year students had an access pattern similar to the second years but varied in magnitude. The same dip in accesses in the weeks preceding the major assignment was observed along with a very large spike in accesses during the study period. The initial surge of accesses at the start of the semester was much smaller than other year levels and arguably not clearly evident. There was a very pronounced swell in accesses in the last few weeks of class, similar pre-exam period wells and exam period spikes can be seen in first and second year but are much more pronounced in the third year data.

Time of Day of Accesses
Figure 3 indicates the time of day accesses were made aggregated across lecture topic and week of semester. All three year levels showed very patterns in the way the accessed the recordings. Most LC accesses were made between 10am and 4pm, with a small lull or tapering off in accesses in the early evening followed. Small fluctuations in accesses are evident at different times 7pm and 10pm. Activity rapidly drops off at midnight, and very few accesses are made between midnight and 7am.
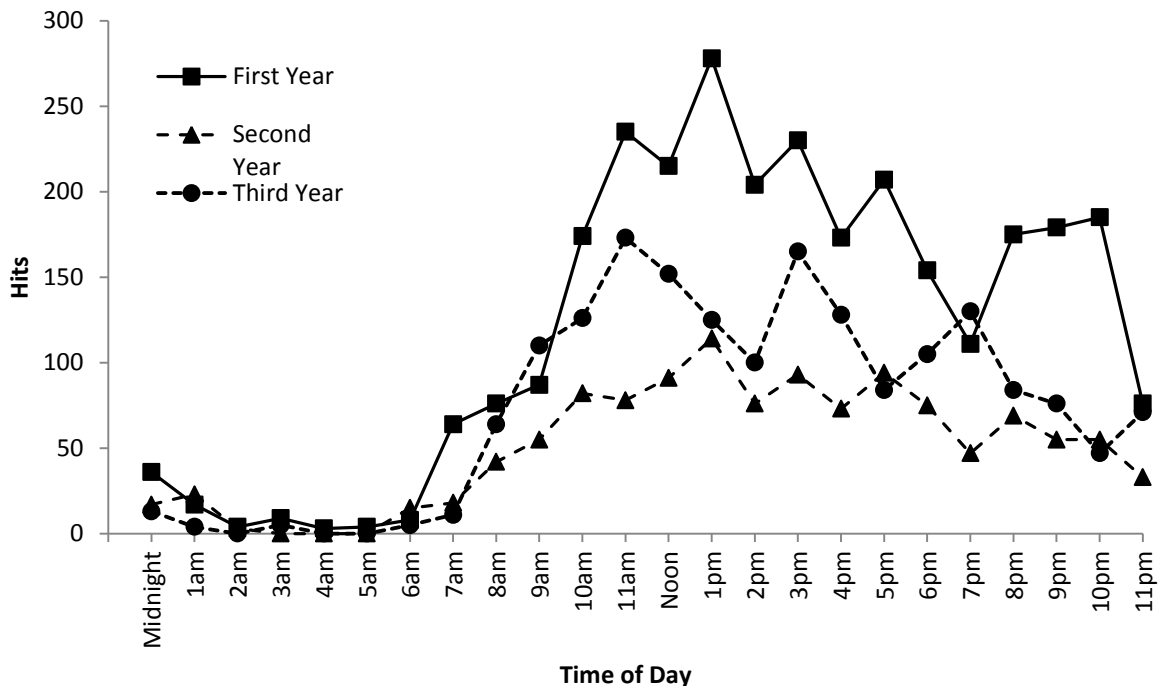
Figure 3: LC download hits by time of day for 1st, 2nd, and 3rd year students.

Phase 2 – Focus Groups

Although students were generally positive about the technical aspects of lecture recordings (quality, access, etc.) one of the main findings was strong differences between students concerning the purpose of lecture. Whether or not LC was seen as a useful tool depended on the student's ideas about the purpose of the lecture. Those who considered the main purpose of the lecture is for the lecturer to impart information to students consider LC to be a very useful tool. In contrast, students who considered the purpose of the lecture is to get students together considered LC to be a poor substitute. The majority of students acknowledged that LC availability played a role in the decisions to attend classes.

As with the student groups, while staff were generally positive about LC there were differences between staff on their views of the technology which were apparently related to their view on the purpose of lectures. Like students, staff who emphasised the transmission on information were generally positive towards it, however, those that saw the purpose of lectures as gathering students together and generating enthusiasm about the topics felt that LC was a poor substitute for face-to-face teaching.

Several staff expressed the concern that LC had the consequence of encouraging student to engage less with the course and affected attendance. One staff member commented,

> I think there are students who do see themselves as being very time poor and believe that they will review the content at another time. But looking at the stats, because I actually do look at all the stats from downloads – they don't [use it]! I think they convince themselves that it's there as a back-up, but they don't use the back-up as much as they should – that's one of the dangers I think of the technology; they fool themselves into believing that it's a safety net.

Staff also expressed concerns related to copyright issues and potential unintentional copyright infringement. One staff member remarked,

> [LC] does change the curricula in terms of copyright, because there's a lot of material we can't broadcast because of copyright restrictions. I think my lectures have become dull because I'm cognizant of the copyright requirements and I have to take out stuff that I would normally have in lecture."
> Some staff remarked that they did not use or like to use LC because of the thought of being recorded, as one staff member said "I don't like the feeling myself of being an a stage and recorded, it makes me feel uncomfortable and I don't feel like I can be myself.

Phase 3 – Student Survey
Some basic demographic information for the respondents is given in Table 1.

Table 2: Year of Study and Average Grade for Respondents

Student Characteristic	% of respondents
Year of Study	
1st	50.9
2nd	14.0
3rd	26.3
4th	3.5
Not given	5.3
Average Grade	
High Distinction	14.0
Distinction	50.9
Credit	26.3
Pass	5.3
Not given	3.5

Although the age and gender profile of the sample was representative of the student body, year of study and grades were not: 2nd year students were significantly underrepresented and first year students slightly overrepresented; students obtaining distinction grades were heavily overrepresented, while students obtaining passes were significantly underrepresented.

Ninety-one-point-two per cent of respondents reported having accessed LC recordings while studying, with exactly one third or respondents indicated that LC was available for all their units, the remainder – bar two respondents who had never heard of LC - indicating that LC was available for only some of their units. Students were asked what usage pattern best described their use of LC, their responses are shown in left two columns of Table 2.

About four fifths of respondents indicated that they tried to attend all lectures and used LC to make up for missed lectures or for revision. Nearly one fifth, however, indicated that LC was used in place of lectures. The respondents who indicated they used LC somewhat were asked what their reasons for doing so were, these responses are summarised in two rightmost columns of Table 2.

Table 2: Students' Style of LC Use and Reasons for (not) Using LC

Usage Style	%	Reason for Use/Non-Use	%[c]
I try to attend all lectures and *not* use LC	7.0	*Reason for LC Use[a]*	
I try to attend all lectures and use LC as a back-up for lectures I miss	42.1	Missed Lecture	68.4
I try to attend all lectures use LC for revision	29.8	Study for examinations	64.9
I use LC *instead* of attending lectures	17.5	Revise lecture material	63.2
I do not attend lectures and do not use LC	3.6	Better understand difficult concepts from the lecture	45.6
		Supplement notes made in lectures	33.3
		Better understand the lecturer	19.3
		Reason for Non-Use[b]	
		Never missed lecture, so don't need LC	26.7
		Unavailable for unit	20.0
		Poor audio quality, poor video quality	0.0
		Large download size	0.0

Note. [a] Reason for use includes only students who used LC. [b]Reasons for non-use includes only responses from students who do not use LC. [c]Respondents could give multiple reasons and thus percentages do not sum to 100

Aggregated, the majority of reasons students gave for using LC reflected a diversity of revision or post-lecture elaboration goals. The single most frequently endorsed reason, however, was using LC to make up for missed lectures. Noteworthy is that in a follow-up question specifically asking about missed lectures 57.9% of respondents indicated that they intentionally missed lectures because they knew they would have access to LC.

Interestingly, students who did not use LC to miss lectures got high distinctions (18.2% vs 12.1%) and distinctions (54.5% vs 51.5%) more frequently than those who used LC to miss lectures. Those who used LC to miss lectures received credits more frequently than those who did not skip lectures knowing that LC would be available (30.3% vs 22.7%).

Those who did not use LC did so because they felt they did not need it or that it wasn't available. No respondents cited quality and download size as a barrier, but most non-users did not provide a reason for non-use from the list of option or in an open-ended response.

Discussion

Lecture Capture Usage Patterns
In interpreting the results and framing this discussion we reiterate three: LC was available for all the units surveyed in this study; while the age and gender of the sample was representative of the student body, high achieving students are overrepresented in this study; this study only surveyed students enrolled in face-to-face programs.

The access data from Phase 1 of the study indicates that students of all year levels in the psychology major have very similar LC access pattern, with first years showing perhaps more initial enthusiasm for the technology, but their use of it waning more quickly. For all year levels LC accesses drop over the first few weeks of classes, suggesting an initial energetic engagement followed by a more sustainable stabilisation of study habits. All year levels also show reduced LC access when large assignment deadlines are approaching, suggesting that students are focusing their efforts on grades and may studying lecture material less in this period. All year levels show the heaviest access during the exam period and these are mostly accesses of the oldest (i.e., first few) lectures. Noteworthy is that the majority of accesses happen in work hours and the "traditional" even study period. The majority of students are not using the flexibility afforded by the system to work "out of hours." A relatively small percentage of students are accessing the system out of hour, and further research is needed into the demography of this group. While there is some steady LC traffic associated with in semester study, this pattern of usage combined with the results of the Phase 3 survey indicate that our students are primarily using LC as a revision tool, with only a small minority using it in place of lectures. Our conclusion that LC seems to be used primarily for revision is broadly consistent with many past studies on LC use (e.g., Copley, 2007), however, this study has provided some additional insight into how this is integrated in students' study plans. Further work is needed to fully understand how LC access patterns relate to specific study habits.

The apparent discrepancy between the reported usage patterns/intentions and stated reasons for using LC (e.g., few students intend to skip lectures, *yet* this is the single biggest reason given for LC use, *but* revision is the most common actual use) provides a good illustration of how the framing of questions can shape responses and interpretation of those responses. Multiple data collection methods also help to understand the broader picture.

The conclusion that students use LC primarily for revision is not inconsistent with the possibility that LC may negatively affect lecture attendance. Phase 2 student interviews confirmed the belief that LC plays a role in absenteeism, and the Phase 3 survey provided evidence that the intention to use LC in this way was associated with slightly lower grades. The number of downloads of the later lectures in this study is not commensurate with the number of absences from class. There is a gap between some students' intentions and actions, and we must be mindful that while students use LC to revise for exam and make up for missed classes, LC may provide students with lower motivation or time management problems a false comfort. This inference can be further underscored by noting that higher achieving – and presumably more engaged - students are over-represented in this study and we know much less about what the weaker students are doing.

Pros and Cons of LC in Flexible Learning
We respect and defend students' right to shape their own learning and make use of technology to create flexible study options. This flexibly has opened up education to many who would have been denied access in a previous age. This said, many lecturers are now asking themselves whether we have an obligation to narrow "choice" somewhat in service of providing better learning designs and thus better student outcomes. It is widely recognised in the health professions that clients do not always do what is in their best interests. Relatively little formal empirical work has investigated this possibility in education, but similar patterns pertain in some well-controlled studies (see, for example, Ariely & Wertenbroch, 2004). We wonder whether lecture attendance, engagement, and ultimately grades would be higher if LC were not available immediately after the live lecture, but provided somewhat later for revision purposes. We also wonder whether the small number of students who may be deliberately using LC as an attendance substitute might not be better advised to enrol in online versions of unit (where available) specifically designed to support learning in the absence of lectures. In the short term

we intend to report the results of this investigation to our students as strong advice on effective study habits and allow them to make an informed choice about their LC use.

Lecture Videos, Copyright, and Teaching Style
Sections VA and VB of the Australia's 1968 copyright act allow certain restricted reproduction of audiovisual and print media for students enrolled in units, however, it is not entirely clear whether the videotaping of presentations that include copyright media (e.g., pictures and artwork) constitute a copyright infringement. Presentation of printed material or artwork in lecture overheads and notes is usually permissible, but technically video recording of the same lecture is not a print reproduction under section VB, rather it is a "broadcast". This does not present a problem for producing lecture notes and audio-only lectures. Nor is it a problem where the visual content has been authored by lecturers, however, most lecturers legitimately use clip art and textbook publishers' materials, which they are increasingly reluctant to include in capture presentations. Few lecturers have the skills or resources to produce all their own art, and uncertainly over the status of video capture of copyright art plus high student demand for LC is prompting some lecturers to deliberately downgrade their teaching materials to avoid inadvertent copyright beaches. Although overcoming self-consciousness is part of every lecturers' professional skillset, LC adds an additional layer of self-monitoring (and possibly unnecessary self-censorship, if the video may be used outside the initial delivery for which it was intended) which can impact lecturer's well-being and alter their teaching style. These issues have significant implications for both teaching quality and course development budgets.

Technical Limitations with this Study and Learning Analytics Involving Videos in Live Courses
Using hit counters to track how many times students access lecture videos has some important limitations for research and teaching. It is widely recognised in the social sciences that most measures indirectly or imperfectly capture the constructs of interest. This limitation is salient for data sources like opinion and retrospective activity surveys where the limitations of human memory or the desire to present oneself in a positive light can clearly bias responses. Click data from websites, the grist for the mill of learning analytics systems, is comfortingly objective and appears to avoid such problems. However, web users will be aware that clicking on an article is not the same as reading it. Hit data on lecture videos only tells us that students are clicking on video links, not what they are doing with them. The correlation between clicks (observable) and views (not observed) may be sufficient to drive broader aspects of course planning and learning analytics software but is probably not sufficient for building good theories of online learning and may have far reaching implications for teaching budgets and completion rates. The only obvious way to objectively and remotely track video usage is to force students to stream (rather than download) recordings and implement a software layer to track how the stream is used. This approach has been used in one study (von Konsky, et al., 2009) and reveals interesting usage patterns. This sort of monitoring software is not standard in most systems and the data it generates is not as straightforward to analyse as click/access data. The LC system used in our study can be configured to allow streaming only. This has some pros and cons. The main pro is that it allows the institution to retain control of its videos – they can be watched but not saved. However, the requirement to stay connected while watching said videos frustrates some viewers (this has been reported to one of the authors) who want to download it to a device (presumably one that is not itself web-enabled).

It is likely that there is a considerable body of grey literature on this topic, such as institutional reports, which may render out literature review a somewhat distorted view of the topic. It is possible that the peer reviewed literature is incomplete. This implies means educators have only limited data outside their own experience to draw on which underscores the importance of publishing papers such as the present one published in accessible places.

Conclusion
A danger with making any sort of recommendation is that one size does not fit all. The diversity of past findings and the results of this study certainly do not provide definitive advice for deploying and integrating LC technology in learning designs. Nor is there likely to be a perfect solution – like most human behaviours, many contextual and historical factors operate to shape outcomes. Because of this we encourage instructors and researchers alike to continue publishing short empirical papers on LC use so that structured reviews and meta-analyses can progress toward divining some of the technological-, student-, and course-related factors that have the biggest impact on effective learning in courses that use LC. At the risk of making unilateral prescriptions, the following general conclusions are be cautiously advanced regarding LC as a supplement in face-to-face courses: There is little evidence that the provision of LC has consistent large negative effects on lecture attendance for typical students – attendance effect depends to some degree on student intentions, attitudes (e.g., beliefs about what lectures are for), student attributes (e.g., year level), course design elements (e.g., activities that instructors do in face to face classes), and effective use of technological add-ons (e.g., video bookmarks,

integrated quizzes). Data to date suggests that on-campus students do not routinely use videos as lecture replacements, but use them primarily as revision and study tools. LC seems to benefit stronger students and students who watch videos in addition to attending class

LC can democratise some aspects of learning and allow students flexibility. It tends to benefit good students but may be a motivational detriment to poorer students. LC seems to provide benefits when it has a clear purpose articulated in the course design or are used in healthy study habits. Availability of videos does not ameliorate the effects of poor course design or bad study habits. Therefore, as instructors when we need to make clear statements to students about how we believe videos (and other technology) can most effectively be used for and impress upon them means of integrating them into their study plans. The effectiveness of a particular technique or technology is highly dependent on context. We encourage researchers to continue publishing details of how specific course content, student characteristics, and technological allowances interact so we can create the best possible teaching and learning outcomes in the future.

References

Ariely, D., & Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control by precommitment. Psychological Science, 13(3), 219-224.

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality of benefits of e-learning. *British Journal of Educational Technology, 36,* 501-521.

Copley, J. (2007). Audio and video podcasts of lectures for campus-based students: Production and evaluation of student use. *Innovations in Education and Teaching International 44*(4), 387-399.

Crain, L. A. (1994). Effects of instructional media on immediate and long term recall. *Interpersonal Computing and Technology Journal, 2*(2), 19-27.

de Boer, J., Kommers, P. A. M., & de Brock, B. (2011). Using learning styles and viewing styles in streaming video. *Computers & Education, 56*(3), 727-735.

Houts, L. M., & Taylor, J. C. (2008). Assignment of grades and student performance in a hybrid operations management course: What works and ideas for improvements. *Journal of College Teaching & Learning, 5*(3), 61-68.

Hudson, T. J. & Holland (1992). Interactive multimedia instruction in video production classes. *Journalism Educator, 47*(3), 18-26.

Kazlauskas, A., & Robinson, K. (2012). Podcasts are not for everyone. *British Journal of Educational Technology, 43*(2), 321-330.

La Trobe University (2012). *Lectopia – audio and visual recordings online.* [web page – authored 27/11/2012) http://www.latrobe.edu.au/lectopia/ [viewed 15 June 2013].

La Trobe Student Union (nd). *Online lecture material for ALL lectures – Sign the petition!* [web page] http://unione.latrobesu.org.au/Common/ContentWM.aspx?CID=60 [viewed 15 June 2013].

Laurillard, D. (2007a). Modelling benefits-oriented costs for technology enhanced learning. *Higher Education*, *54*(1), 21-39.

Laurillard, D. (2007b). Preface. In H. Beetham and R. Sharpe (eds) *Rethinking pedagogy for a digital age – designing and delivering e-learning*. London, UK: Routledge.

McConnell, C. R. (1968). An experiment with television in the elementary course. *American Economic Review, 58*(2), 469-482.

Opinio [computer software] (2013). http://www.objectplanet.com/opinio/ Oslo, Norway: Object Planet.

Slater, T. F., & Jones, L. V. (2004). Assessment of an internet-delivered interactive approach to introductory astronomy for non-science majors. *Astronomy Education Review, 3*(1), 17-25.

Swinburne University of Technology (2013). *Bachelor of Behavioural Studies – Through Open Universities Australia.* http://www.open.edu.au/courses/arts/swinburne-university-of-technology-bachelor-of-behavioural-studies-psychology--swi-bbp-deg-2013 [viewed 16 June 2013].

University of Melbourne (2013). *Existing University-wide policy statement governing lecture capture.* [web page updated 19 May 2013] http://le.unimelb.edu.au/lec/policy.html [viewed 1 June 2013].

University of Melbourne Student Union (2013). *President - UMSU wins changes to University's Lecture Recording Policy*. [web page – authored 24/5/2013] http://union.unimelb.edu.au/president/lecture-recording-policy. [Viewed 15 June 2013].

van Zanten, R., Somogyi, S., & Curro, G. (2012). Purpose and preference in educational podcasting. *British Journal of Educational Technology, 43*(1), 130-138.

von Konsky, B. R., Ivins, J., & Gribble, S. J. (2009). Lecture Attendance and Web Based Lecture Technologies: A Comparison of Student Perceptions and Usage Patterns. *Australasian Journal of Educational Technology, 25*(4), 581-595.

Acknowledgements

Author contact details:
Ben Williams bwilliams@swin.edu.au
Jeff Pfeifer jpfeifer@swin.edu.au
Vivienne Waller vwaller@swin.edu.au

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