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Strong and increasing student demand for lecture capture in the changing Australian university classroom: results of a national and institutional survey

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As the use of classroom lecture capture gains wide acceptance and application around the world, this technology is quickly moving into the mainstream for university teaching. The paper reports preliminary findings of a student survey conducted by Echo360 across seven Australian universities to gain student feedback and perspective on the use of lecture capture technology, focusing on the use of the technology and student results at the University of Newcastle, Australia. Specific focus is applied to the use of lecture capture to enhance the flipped and blended styles of teaching and learning that are currently being implemented.

Keywords: lecture capture, Echo360, flipped classroom, classroom capture, blended learning

Introduction

The global practice of capturing lectures for student personal viewing and study has been gaining acceptance for almost two decades (Danielson, Preast, Bender, & Hassall, 2014). For the purposes of this paper, lecture capture refers to the recording of all content displayed on a classroom computer and the voice of the lecturer while presenting to the class (but generally no video of the lecturer). A number of other tools designed to enhance and extend the lecture experience for students (both inside and outside the classroom) are currently in use at the University of Newcastle and elsewhere, through Echo360's student engagement software and other technologies, but these are not formally discussed here.

At the University of Newcastle, Australia (UON), lecture capture technology has been employed for recording lectures for 10 years, initially using the University of Western Australia's Lectopia product in a few large theatres, and moving to Echo360's EchoSystem in 2011. A major capital project in 2013 saw all 133 classrooms and lecture theatres of 35 seats and over equipped with lecture capture technology. Recorded lectures are made available through the *UONline* Virtual Learning Environment (via Blackboard Learn). In 2013, over 10,000 lectures were captured using this automated system, and approximately 14,000 lectures were captured in 2014. In addition to this, currently has 156 active personal capture users (using their own computers to capture content for their students), and captures using this tool are predominantly supporting the flipped classroom learning and teaching model.

Availability of lecture capture technology is expanding to smaller rooms in most universities, as is the case at the University of Newcastle, and this would indicate the potential to offer far more lecture recordings in the future. The ultimate aim of this strategy is capturing and making available to students all structured lectures offered in equipped rooms.

A considerable amount of research has been conducted worldwide regarding student use of lecture capture technologies, with these technologies having been in common use in higher education institutions globally for many years. Smith and Volker (2013) detail the growth of the technology, and the primary motivations for academic institutions to make recorded lectures available – as well as students' interest in accessing these lectures to improve their educational experience. A preponderance of research indicates that merely viewing lectures captured in this fashion is not an adequate substitute for a well-planned and executed classroom experience (Williams & Hancock, 2012), but that when provided as part of a wider suite of in- and out-of-classroom experiences and technologies, lecture capture can enhance study strategies of modern, tech-savvy students (Brooks,

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Erickson, Greer, & Gutwin, 2011), expand modes of learning to online and mobile platforms and offer flexible learning opportunities (Larkin, 2010).

UON's philosophy regarding captured lectures is that they are primarily for the purpose of enhancing student learning and enabling review of content. The intention has not been to replace attendance at lectures with passive viewing of lecture recordings or otherwise offer these recordings as the primary source of learning for online students. Whilst students continue to come to campus, attend lectures and participate in classroom activities, the demand from students for more content to be captured and put online is clear and growing.

Prior to making the decision to commit to a pervasive approach to lecture capture, UON sought to assure that this mode of learning enhancement was desired and that student demand for the service would continue to grow. Therefore, in 2013, the University joined six other Australian universities in collaboration with Echo360 to survey students regarding their use of lecture capture. UON participated in the survey that took place over a two-week period in May 2014 and included seven Echo360 enabled Australian institutions[1]. The primary goal of the survey was to assist institutions in assessing their students' use of Echo360. The secondary goal was to provide the Echo360 community valuable insight into regional practices, standards and expectations to the benefit of all concerned. 4,206 responses were received from students in the seven institutions.

The survey, containing a mix of Likert-type and open-ended questions, was reviewed by UON's Strategy, Planning and Performance Unit prior to being made available to all UON students within the UONline Virtual Learning Environment. During the 15 day survey period at UON, 1,162 lectures were captured (1,368 hours of content recorded), with 17,353 unique student users accessing the system (approximately half of all UON students) completing 33,364 total views. A total of 458 UON students completed the survey. This is acknowledged as a very low response rate (2.6% of students who accessed the system during the survey period), but findings were directly in line with the overall student responses nationally, so seem to indicate that findings of the national study can be generalised to the UON student population.

Analysis of the responses from the UON cohort of students indicated that they were statistically similar (and in some cases identical) to the total respondent pool of 4,206 from across the seven universities. The findings from these 4,206 responses are described below, noting differences in the findings for UON students where they exist.

Findings of the Echo360 Student Survey – Student feedback regarding lecture capture technology

Analysis indicated that first-year students (See Figure 1 below) viewed captured lectures most frequently (35% of respondents) followed by second-year students (26%). These indicated more active viewing behaviours than third and fourth year students (19% and 8% respectively). However, for many universities, lectures are only captured in large lecture theatres, and these large lectures tend to be first and second year courses. Also, for UON and some other institutions involved in the survey, we have only recently expanded the service offering to take in more classrooms and capture more content; and as such, first and second year students are more accustomed to having this technology available than those in the later stages of their studies. It can be predicted that as the current first- and second-year students progress through their programs, they will expect the same learning supports (i.e. lecture capture) as have been available early in their programs.

Male students reported accessing lecture recordings with much greater frequency (73%) than female students (37%). There was no indication from the current study to explain this behaviour, but this may relate to general engagement with technology as well as the potential for impact of the types of programs in which male students are enrolled. Gender differences in student attendance have been reported previously by Arulampalam, Naylor, and Smith (2012) who reported that significantly more male students are absent from classes generally than are female students. This may indicate the possibility that males more than females take advantage of lecture capture technology to make up for missed classes.

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[1] University of Newcastle, Murdoch University, University of Canberra, University of South Australia, University of Tasmania, Victoria University, Monash University.
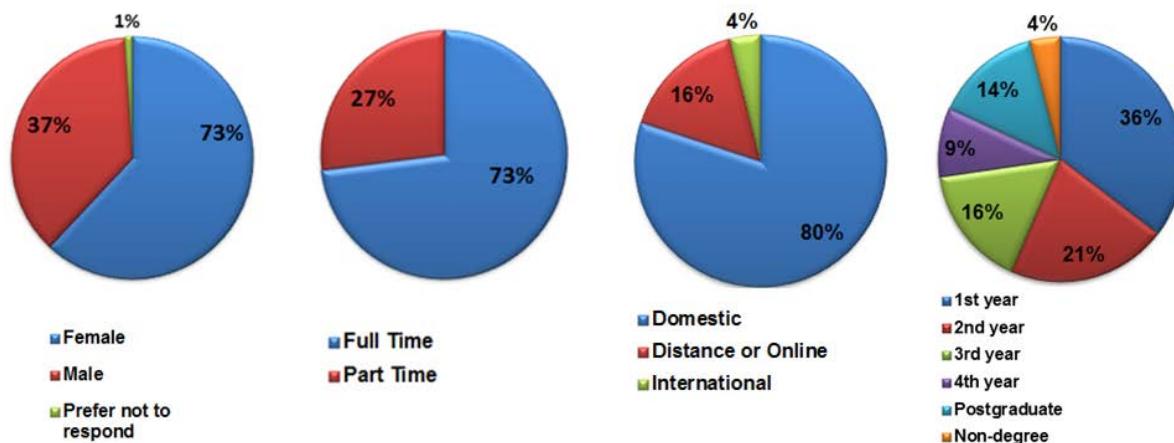
Figure 1. Demographic results from student responses in Echo360 national survey

No significant difference in viewing habits was reported between full-time and part-time students, which is somewhat surprising given the greater number of activities in which part-time students engage, and which compete for their time and attention. The national survey indicated the following breakdown of hours that students worked while studying:

Table 1. Number of weekly hours of work outside of study from Echo360 national survey

If you are employed, how many hours per week do you work?		
Answer Options	Response Percent	Response Count
Not employed	34.80%	1446
1-5 hours	8.90%	368
6-10 hours	13.40%	556
11-20 hours	20.20%	838
21-35 hours	9.90%	411
Full time	12.80%	533
answered question		**4152**
skipped question		**16**

This data (see Figure 2) indicates that of all students responding, approximately 22% worked more than 21 hours per week, with almost 13% working full-time. It is an interesting finding that almost 35% of students responding to the survey did not work outside of university at all, but were still taking advantage of the use of captured lectures for study.

Results of the UON survey showed significantly more international students (13%) than was reported in the national study overall (4%). This suggests that more UON international students are taking advantage of the technology, potentially to address English language deficiencies. This is most likely a reflection of the general UON demographic, although the percentage of UON international students responding to the survey was just slightly higher than the overall international student population at UON in 2013 (11.5%). Recorded lectures hold clear advantages for students who struggle with understanding spoken English, as they are able to review the lecture, along with slides and other resources, as often as is necessary in order to master content.

There is evidence that disabled students may take more advantage of available captured lectures. In the Australian survey, over 6% of students self-identified as having a disability, which is just slightly

higher than the Australian university national average of 5.2% of students self-identifying as disabled[2]. Karnad (2013) reported that lecture capture technology can positively assist disabled students in their study and academic success and further focus should be put on the specific ways that this can be accomplished. As additional focus is placed on the support of students with a variety of disabilities, lecture capture technology may have a particular functionality, especially if augmented with closed caption text.

The majority of students (66%) indicated that they wished to have classroom-based recording offered for all of their classes. Also, 75% percent indicated that the ability to study both in a face-to-face mode in conjunction with an online resource helps them better understand the concepts. Students indicated qualitatively that the two most common reasons for viewing recordings were that they used the classroom-based recordings to revisit and clarify complicated and confusing topics, and that access to these recordings helped to balance their schedules which included university, family and work responsibilities. A slightly lower percentage (69%) of UON students, when compared with the total national sample (75%) reported that they used recording to balance their schedules. This is a somewhat surprising result considering that UON has a larger than average population of students from low SES backgrounds and with other demographics (such as being first in family to attend university, of mature age, and single parents) that may see them as less prepared for university study on entry. These students could be considered to have more complex and demanding schedules than the 'average' Australian university students, and should therefore be in a position to take better advantage of the flexibility of study offered by lecture capture technology. It is possible that this lower percentage is a result of the lack of lecture capture offerings in certain programs, and this may be mediated once all lectures are captured and made available. Figure 3 shows the full responses from students regarding their preference for use of classroom-based lecture recordings:

Table 2. Reasons students use classroom-based recordings from Echo360 national survey

Why do you use classroom-based recordings? Tick all boxes that apply.		
Answer Options	**Response Percent**	**Response Count**
Helps me stay in a class I would otherwise have dropped	21.7%	684
Helps me balance my schedule/responsibilities	71.2%	2249
Reviewing classroom-based recordings as a substitute for attending class	48.5%	1530
I rely on classroom based recordings because English is not my first language	6.8%	216
Help me better understand instructors with strong accents	29.1%	918
Help me use my time more efficiently	57.1%	1802
To learn at my own pace	62.6%	1976
To revisit and clarify complicated or confusing topics	74.5%	2351
To help prepare for exams	63.9%	2018
I believe classroom-based recordings help me to achieve higher grades	48.9%	1545
Classroom-based recordings improve my overall learning experience	11.3%	358
answered question		**3157**
skipped question		**1011**

Student qualitative comments indicated that the four most frequently noted aspects of lecture capture that students liked best were: 'flexible learning', the ability to set the pace of their own learning; 'convenience', allowing them to view content in line with their own schedule irrespective of their location; 'reviewing content', the ability to review difficult concepts multiple times and pause and rewind as necessary; and 'negotiating commitments', the ability to manage distractions relating to work, family and medical issues and view lectures as suited their life circumstances. This is very

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[2] Source: Australian Government Selected Higher Education Statistics – 2013 Student Data: Table 2.6: All Domestic Undergraduate Students by State, Institution and Equity Group, 2013.

much in concert with the quantitative results reported from the survey. Linked to these student perceived benefits of lecture capture were comments relating to the two most favoured features within the system: the 'variable speed playback' feature, which allows students to speed up and slow down passages of the recording; and the 'scenes' feature, which provides students with visual thumbnails from the whole lecture and allows them to go directly to the area of the lecture that they wish to review.

Several negative comments from students were also noted from the qualitative comments. Students were not always satisfied with the audio capture, and were frustrated that they were unable to hear student comments and questions that comprised part of the lecture. Students also indicated dissatisfaction that they were unable to see the lecturers' expressions and actions (unable to see writing on a white-board or pointing to things off screen). This was particularly noted when lecturers used any form of non-digital presentation tool. Incomplete capture was a source of frustration for students, arising from circumstances where the beginning and/or end of the lecture were cut off on the recording. Some students indicated that distractions when viewing lectures would require them to rewind and re-view several times, making it more time-efficient to attend the actual lecture. Comments were also made regarding the poor audio or video quality of some lectures, indicating that students are becoming discerning consumers of the technology. Several students also commented that a disadvantage of viewing lectures at home is the inability to ask questions as you think of them.

All of these disadvantages arise from students using lecture capture as a sole means of 'attending' a lecture. Attendance at the face-to-face class would mitigate all of these issues, and students utilising the technology strictly as a review tool, or one used sparingly for those circumstances when classroom attendance is truly not possible, would not experience these problems to such a great extent. At the University of Newcastle, captured lectures are intended strictly as an addition study/review tool, and are not presented as an alternative means of study, or a legitimate/sole means of online learning.

It should be noted that many of these concerns voiced by students in relation to their captured lectures are now being actively addressed through the implementation of Echo360's student engagement functionality. When the next survey is conducted within the next two years, it will be interesting to note changes in student feedback as this functionality allowing much more synchronous student engagement is brought into universities' virtual learning environments.

Generally, the national survey, whose results were reflected by the participating UON students, provides a clear indication that there is general acceptance and appreciation of the technology by the majority of students. There is reason to believe, therefore, that student demand for this resource will remain on an upward trajectory.

Echo360 in the Flipped Classroom

As many universities are moving into more engaged modes of learning, incorporating blended and fully-online environments, the survey yielded results relating to student opinion on the use of this technology for modern learning environments.

- 48% of respondents reported that their instructor published digital content via Echo360, in addition to (or instead of) lecture captures.
- Of those respondents, 59% said that their instructor encouraged them to watch this digital content prior to attempting an on-campus or online synchronous teaching activity.
- The open-text responses regarding the availability of digital content are predominantly positive, recognising value in the in-depth content focus of this material and the opportunities it provides for more interactivity and discussion in synchronous (face-to-face or online) activities.
- The negative comments made in the survey about digital content relate to concerns about synchronous (face-to-face or online) activities being replaced by this content; also, a number of respondents felt that the lack of personal interaction with the digital content (particularly, the inability to ask questions) made it a difficult medium for widespread use.

The above indicates that lecture capture technology is taking a significant place in new blended learning environments, but there are still some significant impediments to engagement for students. It can be interpreted that while captured lectures can extend and enhance learning opportunities,

educators must be careful to offer enough enriched activities to ensure students have a variety of options when expected to construct their own learning. Lecture capture technology clearly offers numerous options for assisting students with content mastery. As we move to more complex learning outcomes, such as analysis and synthesis, other opportunities for personal engagement (whether face-to-face or online) must still be considered to provide students with a balanced range of learning opportunities that address a complex variety of learning outcomes and student learning styles.

Limitations

When considering the above findings, it must be acknowledged that all results are by means of self-report. Gorissen, van Bruggen, and Jochems (2013) discussed the limitations of student self-report regarding the use of lecture capture, and the potential that student motivation for using lecture capture, as well as behaviours that are self-reported are not definitive without triangulating data such as actual usage reports and correlation of that data with grades and other performance indices. As we decide that students are using captured lectures for the *right* reasons (i.e. not just to enable non-attendance at classes), we must be careful to assure that this is the case. These authors suggest that additional data collection is necessary prior to acceptance of students' reported activities and motivations. As this learning technology becomes more pervasive, and with the current introduction of complex learning analytics (Bichsel, 2012) to enable much richer analysis of student study behaviours, more definitive determinations will be possible relating to student motivation for accessing recorded lectures.

University teachers' acceptance of lecture capture as a teaching tool

University teachers' acknowledgement and acceptance of lecture capture benefits for students has been mixed and is not as consistent as the ringing endorsement reported by students. It is true that many university teachers have embraced the technology for a decade now, and have voluntarily and even enthusiastically provided captured recordings of their lectures. Germany (2012) reported that many of these academics are actively seeking technological enhancements that will make the lecture viewing experience more interactive for students and see the technology as an integral part of their teaching. As with other learning technologies, it is important for these early adopters to lead the way when entrenching any teaching method into a university's learning culture.
Other university teachers, however, are not so anxious to adopt the technology. Many teaching academics react with suspicion, caution, and even consternation when confronted with the concept that by policy, all of their lectures will be recorded and made available to their students (Larkin, 2010). A primary objection raised by many university teachers is the impact of offering captured lectures on student attendance. Von Konsky, et. al (2009) refuted this concern, reporting similar attendance patterns for students whether or not captured lectures were available for them to view. The current study results indicate that less than half of the respondents (48%) reported that viewing captured lectures was a substitute for attending class. An argument can be made by those who are skeptical, however, that this is almost half of their students admitting to reducing class attendance if the technology is available. Holbrook and Dupont (2009) reported that available captured lectures are more likely to cause early-year students to miss class than those in upper years. This may be related to a maturity of study and learning strategies, but also reflects the more personal nature of smaller upper-year classes, adding more value to face-to-face attendance. This certainly places a greater onus on the university teacher to present a lecture experience that is compelling enough to make students see the benefits of attending.

Conclusion

Recording lectures and making them available to students online has become standard practice in most Australian universities as well as those around the world. For some, the decision regarding whether or not to capture individual lectures is left up to the university teacher responsible for the course (or School, Faculty, etc.). Others have decided to entrench the facility in an 'all-in' or 'opt-out' fashion, as has been the decision of the University of Newcastle and several other Australian universities including the University of Melbourne, La Trobe University, and the University of Western Sydney. A primary challenge with this model will be to convince some of those teaching academics who are still suspicious of the impact of the technology to embrace and leverage the potential of lecture capture as a critical learning tool for their students. This will require a well-defined and

resourced communication and professional development strategy on the part of teaching and learning centres.

Considering the rapid rate of conversion of teaching methodologies to blended or 'flipped' modes of learning, we may look back on lecture capture as a transitional technology, 'filling in' for those classes that have not yet been redesigned to include the additional in-class engagement and online content mastery that is becoming increasingly accepted and expected as the preferred method of teaching and learning. We have a long way to go, however, before all (or even most) traditional lectures have been 'flipped' in this fashion. For now, increasing student demand and expectation for the availability of captured lectures that can be viewed independently will assure a sound future for traditional lecture capture, and a bright future for the increased interactivity within the platform that is currently being introduced.

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