DE GRUYTER OPEN

ICTE Journal

2017, **6**(2): 23–36
DOI: 10.1515/ijicte-2017-0009

ENTERPRISE LECTURE CAPTURE TECHNOLOGIES AND VALUE TO STUDENT LEARNING

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ABSTRACT

Enterprise Lecture Capture technologies have increasingly become pervasive in higher education. This article presents student views on the value of recorded lectures and their contribution to learning. The research examines how students engage with recorded lecture materials and the likely of this engaging impacting on lecture attendance. The results suggest that students found access to recorded lectures valuable to learning. They reported that recorded lectures offer alternative learning opportunities for missed lectures and are useful in revising for exams. Analysis of the data further revealed that provision of recorded lectures to students does not directly contribute to class absenteeism. The present study adds to growing research evidence in support of the value of recorded lectures in enhancing student engagement with learning materials.

KEYWORDS

Enterprise Lecture Capture, Recorded lectures, flexible learning, engagement, learning.

1 INTRODUCTION

Enterprise Lecture Capture technology describes a group of emerging learning technologies (e.g. Echo 360, Podcast, recollect, e-presence or Camtasia). These technologies are used for recording audio, video, PowerPoint and events associated with learning. Further, educators use these technologies to produce learning materials to enrich face-to-face, online or blended learning environments (ELI, 2008; Larkin, 2010; Rui, Gupta, Grudin & He, 2004; Toppin, 2011; Zhang, Rui, Crawford, & He, 2008; Wald & Li, 2012). The rapid deployment of these technologies is attributed to students preference to courses that are accompanied by online recordings because it helps them effectively review missed classes (Daniel & Bird, 2016; Gorissen, Van Bruggen, & Jochems, 2012; Owston, Lupshenyuk & Wideman, 2011).

There is a large body of studies that suggests that students' engagement with recorded lecture materials improve learning. For example, O'Callaghan et al. (2015) conducted a systematic review of several research studies looking at the deployment of recorded lectures in higher education and benefits to student learning and concluded found that students find the availability of recorded lecture materials valuable to learning. Similarly, Yeung, et.al. (2016) recently reported that first-year students find the use of recorded lectures in blended learning context useful to learning. Research has also revealed that recorded lectures provide students with flexible learning opportunities because many students can conveniently access these resources through their mobile and ubiquitous devices (Manca, Caviglione, & Raffaghelli, 2016). Additionally, a recent review suggests that lecturers recognize the benefits of lecture recordings for students learning and

teaching opportunities afforded by these technologies (O'Callaghan, et. al., 2015). Despite the positive learning experience associated with engagement with recorded learning materials, there is a growing literature contesting access to recorded lecture materials and students engagement in learning. It has been argued that making recorded lectures available, disrupt lecture attendance (Chang, 2007; Stroup, Pickard & Kahler, 2012).

The article adds to the growing body of research on student engagement with recorded lecture materials. The goal of the study reported in this paper is to explore how students engage with recorded lecture materials and whether or not this engagement is likely to influence lecture attendance. The research aims to open dialogue on students' expectations of the digital learning environment and identify professional development opportunities for university teachers to engage with digital technologies in teaching effectively.

2 RELATED LITERATURE

Educational researchers have been questioning teacher-centric approaches to learning that focus on information transmissions, rather than active learning (Safari & Rashida, 2015). Due to the increasing diversity of students entering into higher education institutions, researchers have suggested the utilization of student-centred approaches, which involve active engagement in the classroom, encouraging students to be in control of their learning (Michael, 2006; Freeman et al., 2007; Chaplin, 2009). Subsequently, several institutions are actively exploring these approaches, together with strategies to transform learning environments through the use of digital tools (Walvoord & Johnson, 1998; Baker, 2000; Billings-Gagliardi & Mazor, 2007). Active learning approaches are student-centered, technology-rich learning environments. They involve the provision of blended and online learning environments (Green, 2015), supported by various forms of enterprise learning technologies (e.g. learning management systems, recorded lectures, class response systems). Blended learning environments provide students with flexible learning opportunities including access to various learning resources (McGarr, 2009).

Many institutions use Enterprise Lecture Recording technologies to support the pre-production of learning resources for blended learning environments. Institutions of higher education deploy lecture capture technologies in the classroom for the following reasons:

- to enhance student engagement with course materials and promote flexible access to learning (Al Nashash & Gunn, 2013; EDUCAUSE, 2008),
- enable students effectively revise for lectures and exams (Brooks, al et 2011),
- to allow students catch up on particular parts of lectures they might have missed during live lectures (Karnad, 2013; Marchand et al. 2014; Song, et.al, 2006),
- moreover, as a substitute for missing face-to-face lectures (Craig, et, al, 2009; Willing & Hofman, 2010).

Students access to recorded lecture materials show consistent patterns, with the highest peak normally seen at the beginning of the semester, dropping sharply in the middle of the semester, and rising at the end of the semester, nearing exams (Kinnari-Korpela, & Korpela, 2014; Phillips et al. 2011). However, there are exceptions in some domains (e.g. Medicine), when students are more likely to access recorded lectures even for a class they have completed (Perumal & Daniel, 2015). A substantial number of studies have revealed that students positively value the availability of recorded lecture materials (Dey, Burn, & Gerdes, 2009; Gosper et al. 2007; Green, Pinder-Grover & Millunchick 2012; Pale, Petrović, & Jeren, 2014; von Konsky, Ivins, & Gribble, 2009).

Absenteeism has been a significant problem in many institutions of higher learning (Chang, 2007; Devadoss & Foltz 1996; Romer, 1993). Researchers have linked absenteeism to poor learning outcomes (Devadoss & Foltz, 1996; Romer, 1993; St Clair, 1999; Thatcher, Fridjhon, & Cockcroft, 2007). A main outstanding debate in the literature related to the deployment of recorded lecture materials is that it is more likely to disrupt lecture attendance and exacerbate the issue of absenteeism. It has been argued that if recorded lecture materials are made available, then some students would treat them as a replacement for live lectures (e.g. Davis et al. 2009). Yet, some researchers found a weak correlation between student access to lecture materials online ahead of scheduled lectures and drop in lecture attendance (Traphagan et al. 2009; Walls et al. 2010). Others showed no significant effect on students access to recorded lectures and absenteeism (Holbrook & Dupont, 2009; O'Callaghan, et. al., 2015; Philips, et, al., 2011; Pursel & Fang, 2012; Traphagan, et, al, 2009; Yeung, 2016).

The issue of class absenteeism is significantly complex; students make deliberate decisions to attend or not to attend particular lectures, irrespective of whether or not they have access to recorded lecture materials in advance (Mattick, et al. 2007; Billings-Gagliardi, & Mazor, 2007). Many factors influence lecture attendance, including the quality of a particular lecture, conflicting deadlines on assignments in other classes, the lecturer's ability to engage, sustain and entertain students in class, and illness or bereavement (Van Blerkom, 1992; Clay & Breslow, 2006; Lovell & Plantegenest, 2009). This research is motivated by students' changing expectation of the digitalization of learning in higher education. It focuses on student experience with the provision of recorded lecture materials and the extent to which this disrupt regular attendance.

3 BACKGROUND TO THE STUDY

Students remain the main advocates in support of the use of recorded lecture materials. Enterprise Lecture Capture technologies provide educators with flexible ways to capture teaching and learning interactions. The research reported in the article is part of an ongoing research project in a teaching and research intensive public university in New Zealand, where teaching staff were provided with the opportunity to record lectures and make them available to students. This initiative is part of a wider institution redesign of the learning environment with aim supporting the digital learning environment.

3.1 Research Questions

The research project reported in this article sought answers to the following issues:

1. What are students' perceptions of the value of recorded lectures to learning?
2. How are students engaging with recorded lectures?
3. Will provision of recorded lectures contribute to lecture attendance?

4 METHODS AND PROCEDURES

This study is guided by a survey research design, utilizing an online questionnaire with closed and open-ended questions. By employing a multi-model approach to data collection, qualitative responses were used to explain the quantitative measures and to provide context for interpretation of the results. The development of the questionnaire involved reviewing current research studies on the utilization of recorded lectures and challenges associated with these learning resources. The questionnaire was designed to collect demographic data and students perceptions of the value of recorded lectures to learning. The recruitment procedure involved profiling all University courses (n=132) that were providing recorded lecture materials

to students. Academic staff responsible for each course was requested to send an email inviting students to participate in the survey online. A total of 228 students voluntarily participated in the survey.

5 DATA ANALYSIS

The questionnaire generated quantitative and qualitative data analyzed concurrently. Specifically, the responses to closed-ended questions were analyzed using IBM SPSS 22, with descriptive statistics used to summarize the results. Moreover, responses to open-ended questions were compiled and thematically analyzed using NVivo software. The process involved reading and re-reading the open-ended responses (Brauan & Clarke, 2006), themes were identified within segments of texts associated with the closed-ended questions and coded for prevalence as well as the frequency of occurrences. Table 1 presents respondents' demographic information.

Table 1. Respondent demographics

Category	Respondents (n, %)
Division	
Health Sciences	(120, 58.8)
Sciences	(48, 21.5)
Commerce	(26, 11.7)
Humanities	(16, 7.2)
I don't know	(12, 5.4)
Year	
First year	(66, 30)
Second year	(60, 27)
Third year	(64, 28)
Fourth year	(17, 8)
Other	(15, 7)
Technology usage	
Laptop	(211, 93)
Desktop computer	(46, 20.2)
Tablet	(35, 15)
Smartphone	(31, 14)
Other smart device	(4, 1.8)
Other	(3, 1.3)
Age range	
17-24	(202, 89.8)
25-34	(14, 6.2)
35-44	(6, 2.7)
45-54	(2, 0.9)
55+	(1, 0.4)

6 RESULTS

Overall results indicated that the availability of recorded lecture materials significantly contributes to student learning. They serve as revision tools and help students to engage with the content of the subject deeply. Recorded lecture materials also set the stage for improved engagement between students and lecturers. Further, the provision of recorded lectures to students ahead of scheduled lectures does not necessarily result in absenteeism. The proceeding sections present detailed results along the three research questions.

6.1 What are students' perceptions of the value of recorded lectures to learning?

Recorded lecture materials offer students numerous opportunities to access and review learning materials. Respondents stated that they strategically use recorded lectures to foster deep learning. As a tool, these materials help them in revisiting complex concepts they might have missed during lectures. Furthermore, respondents said the availability of recorded lectures after scheduled lectures offer an opportunity to concentrate on listening to the lecture instead of taking notes during lectures. Access to recorded lectures helps students to plan their schedule and efficiently manage time.

> *"Allows me to search and review when having difficulty understanding. It is less stress to write things down during the lecture so that you can listen! When I can progress through course material at my pace, I feel like I am making good use of my time, which is very rewarding and makes me more excited to engage with the material because it is at a suitably challenging level."*

> *"In one of my subjects, I struggle with the material, so it makes a huge difference being able to hear it again before a tutorial. It leads to better grades in my tutorial. I can go back and answer questions and come up with better, more informed questions for a lecturer."*

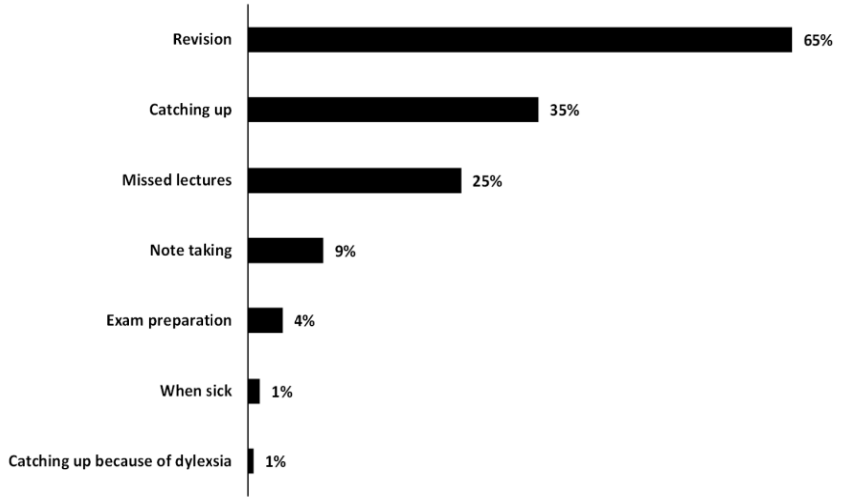
Results of the survey (see Table 2) are consistent with the observations that recorded lectures augment live lectures. A significant number of respondents reported that recorded lectures helped them to effectively review lecture content (194, 85%), and to be able to get back with highly complex issues they might have grappled with during lectures (173, 76%).

Table 2. The most useful aspects of recorded lecture materials to learning

Why I use recorded lectures	Total respondents (n, %)
Being able to review the lecture again	(194, 85)
Being able to review the clarification of issues or questions	(173, 75.9)
Flexibility of where I can listen to the lecture anywhere anytime	(150, 65.8)
Revision for exams	(105, 46.1)
Being able to listen instead of also taking notes in lectures	(78, 34.2)
So that I do not have to go to lectures	(24, 10.5)
Other	(14, 6.1)

Further, the availability of recorded lectures online provided students with the flexibility to access learning materials across time and space (anytime and anywhere) (150, 66%). Over half of the students mentioned that they use recorded lecture materials when studying for exams (105, 46%). Several Themes describing various purposes for using recorded lectures were identified in the data (see figure 1). Among them, the revision was the most predominant use of recorded lecture materials.

Figure 1. Major themes: I use recorded lectures for:



Recorded lectures help students with learning disability (e.g. listening, language or motor skills) to tackle the challenges of taking notes and listening to the lecturer.

> *"I am dyslexic, and for some lectures, it is tough to take notes because of the pace of speech or the complexity of the words I am trying to write down or a combination of both. This was the case when I took a law class, and I believe I would have failed the second semester if lectures were not recorded."*

> *"It is helpful to listen to recorded lectures because of my dyslexia I cannot take down all the notes from the actual lecture, so I need to review the lecture on the stuff I missed out on to supplement to notes."*

The analysis examined whether the year of study differs with perceived value of recorded lectures, a Chi Square test was conducted. Results showed that first year students(66), second year students (60) and third year students (64) were more likely to value recorded lectures, compared to students in the final year (fourth year) of their programme (33); ($x2 = 100$, $df=25$, $N=227$, $p\leq0.05=0.001$). Further, the Phi value seems to suggest a strong (0.67) and significant ($p\leq0.05=0.001$) relationship between students perception of the value of recorded lectures and the year of study.

6.2 How students engage with recorded lectures?

Respondents held a consistent view on the value of recorded lectures to learning across divisions (see figure 2). Four levels of engagement with recorded lectures were identified: engagement with content, engagement with the lecturer, and engagement with peers (see Table 3).

Figure 2. Student engagement with recorded lecture and improved learning

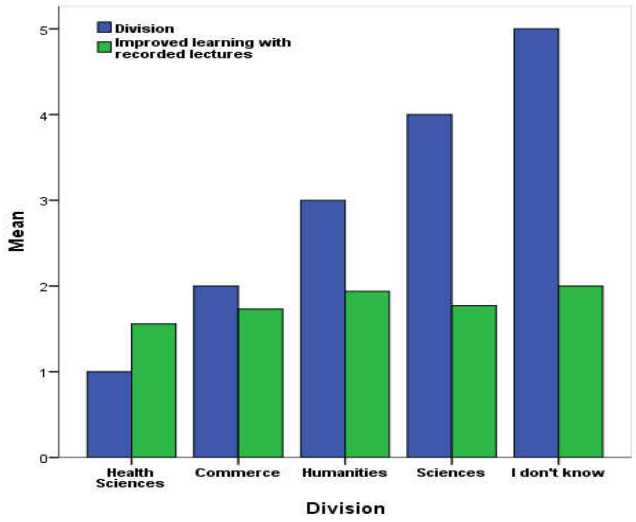


Table 3. Contribution of recorded lectures to learning by year of study

Current year of study	Respondent (n, %)	Median	Std. Deviation
First year	(66, 29.5)	1	0.84
Second year	(60, 26.8)	2	0.92
Third year	(64, 28.6)	1	0.69
Fourth year	(17, 7.6)	2	0.64 1.25

Time of access to recorded lecture materials was also identified as a crucial element in the extent to which these resources can have on student learning. Respondents' different time preferences to access recorded lectures, with the majority in favoring access after scheduled lectures (152, 67%). Others said they prefer access to these materials anytime during the semester (53, 23.3%). Respondents also stated that they better engage with the content of a lecture when they were able to view the recorded materials in conjunction with other learning materials (see Table 4).

Table 4. Use of recorded lecture materials

How I use recorded lectures	Respondents (n, %)
In conjunction with other study related materials (e.g. notes, textbook)	(194, 85.1
During my study time at the University	(165, 72.4)
In my leisure time at home	(127, 55.7)
In conjunction with other social media	(36, 15.8)
While I am doing other things	(26, 11.4)
During lectures	(19, 8.3)
Other	(7, 3.1)

6.2.1 Engagement with the subject

A large number of those who filled in the survey reported that the use of recorded lectures improved engagement with the subject (181, 80.4%). They were able to review and listen to recorded lectures to be better understand what the lecturer said in class.

> *"Sometimes lecturers talk quite fast and move on before you have time to write everything down. Having the lectures available makes it easier to catch key information because you can pause the recording and write it down with your notes before hitting play again. You are allowed to digest the material at your speed, so you understand it more thoroughly."*

> *"For lectures where much material is covered, or that where I am finding it a bit harder to understand, recorded lecture materials are great to use after going to the lecture. Also, a couple of times I have decided not to go to class and use the time to work on an assignment due that day, because I know I can have access to materials later and get good notes. That way I was able to manage my time effectively."*

6.2.3 Facilitating engagement with Lecturer

Respondents did not have a shared view on whether or not recorded lectures helped them engage with the lecturer. Over a third (78, 35%) reported access to recorded lectures helped them connect with the lecturer and ask specific questions on concepts they did not fall under in lectures. Others mentioned that access to recorded lectures did not contribute to better engagement with the lecturer of the course.

> *"As I can listen more attentively to the lecture, I can pick out the parts that I find the most difficult more easily and then I can ask the lecturer more precise questions after, rather than general issues that may have arisen due to focusing on writing notes and missing key information…."*

> *"When I review the lecturers material I get more familiar with how the lecturer presents information in the lecture theater, and ultimately facilitating my learning."*

> *"Recorded lectures are far more helpful when the audio is accompanied by the visual of the lecture slides; it makes it easier to use the recording because you are not distracted by trying to keep up with what slide the lecturer is on."*

6.2.4 Facilitating engagement with peers in and outside of class

The survey asked students whether the use of recorded lectures improved their engagement with peers. A large number (114, 50.7%) stated it did not. However, a small number (30, 13.3%) said access to recorded lecture materials helped them to engage effectively in discussions with peers. Others were indifferent to this question.

> *"If I am listening to the recording because I am sick and not attending, then I am not engaging with my peers. However, as the recording helps me understand the material more thoroughly, I engage more with my peers because I am more confident in the material and ask more questions. I also think that the ability to review information and better understand it leads to a better discussion with peers*

"When studying in groups...I can pause the lectures and discuss questions with classmates, which I am unable to do during the lecture. I do now write down questions I think of during the lecture to ask later on."

6.3 3. Will provision of recorded lectures ahead of scheduled lectures affect lecture attendance?

Significantly a larger majority (204, 90%) of respondents stated that attending lectures is crucial to their learning. They mentioned that they view the availability of recorded lectures as supplementary to live lectures rather than a replacement. They also said they felt obligated to attend lectures because they pay fees to learn from lecturers in class rather than listening to audio or video transcripts on their own.

"I think skipping lectures is a waste of time; it is easier to learn it from the lecturer rather than have to do it in your own time. Recording help with being able to listen again and pick up things you may have missed while you were writing notes in the lecture."

"I pay for a lecturer to teach me, why not show up prefer lectures, doesn't matter and I do not like being "behind" whatever how hard we study, and the school does not want us to pass at all.

"I pay for the lectures, the immersion and experience and knowledge from the lecturers and university environment, not for the equivalent of a long YouTube video. Furthermore, readings are provided for each lecture that is for preparation before the lecture, making both available before the lecture would make one of them.

Some respondents mentioned that the availability of recorded lectures online did not stop them from attending lectures, because they believe they learn better during lectures as more information is often presented during lectures.

"Having the lectures available online is no replacement whatsoever to physically being at the lecture. A lot more details are processed and understood in the actual lecture theater itself. The physical act of going also reinforces to the brain that the lecture theater is a place of learning and hence will absorb more information."

Respondents also mentioned that attending live lectures offers them an opportunity to socialize with other students, facilitating the collaborative learning experience. They also mentioned that going to the lectures provide them numerous opportunities to engage with peers, share knowledge and ask the lecturer questions during lectures.

"Going to lectures gives you the opportunity to ask questions and draw any diagrams from the overhead projector that are not on the recording. Going to the lecture also ensures that at least you have learned something instead of putting it off until later. Recordings are an aid, nothing else."

"In my experience so far, I have found the recorded lectures very useful if used as a resource to support and further enhance learning. It has most definitely helped me numerous times and solved the problems I was having regarding not understanding/having questions."

Although a significant number of respondents indicated that recorded lecture materials are supplementary to live class, there was a small number (22, 11%) who in contrast saw these materials as a replacement for live lectures.

"If recorded lectures are made available, I will feel as though probably wouldn't attend the lectures because I would have all the content online. Then again, I would still think of attending the lectures as I would be able to ask the lecturer questions about the material I have not understood and sometimes the lecturer may vary their lecture."

"Access to recorded lectures gives an excuse not to go if I am running late or have something else on. But if recorded lectures are not made available, I feel that going to the lecture is my number 1 priority, but if they are provided, then my priorities might change."

6 DISCUSSION

Lecture Capture technologies such as videographers, Echo360 can record a vast amount of information for a variety of purposes. Research suggests that these technologies provide educators, administrators, and students with a set of powerful tool for enhancing the educational experience (DeSantis, et al. 2011). For this reason, the number of teaching and research intensive institutions are increasing utilizing these technologies to record their teaching activities and making them available to students. Observational studies on student engagement with recorded lectures consistently report positive learning outcomes (Grabe, & Christopherson, 2008; Traphagan et al. 2009; Walls, et al. 2010).

Consistent with the evidence available in the literature, a significant number of respondents in the research reported in this article viewed recorded lectures positively. They said that the availability of recorded lectures afforded them with most needed flexible access to learning anywhere and at any time. Results of the analysis also showed that students use recorded lectures primarily for revisions, especially when preparing for exams, with a small number of students who reported using recorded lectures as supplementary for missed lectures, or aid for clarifying issues missed during lectures. Though the majority of respondents viewed the availability of recorded lectures as complimentary to attending live lectures, some view recorded lectures as a substitute for scheduled lectures.

Further, contrary to previous studies suggesting that low achieving students are more likely to benefit from lecture recording (Kinnari-Korpela & Korpela, 2014; Owston, et al. 2011), results of this study revealed that all respondents highly value the contribution of recorded lectures to their learning. Availability of recorded lectures can foster effective student engagement with learning. The majority of those surveyed in the study reported that the ability to access, especially after lectures improved their engagement with the content of learning materials, and improved their interaction with the lecturer. Further, respondents stated that the availability of recorded lectures provided them with an opportunity to attentively listen to the lecturer during lectures, instead of listening and taking notes at the same time. Also, students found recorded lecture materials useful in facilitating active learning in collaborative spaces, and vibrant discussion on difficult topics.

Lecture attendance and absenteeism (see, for example, Moore, et. al., 2008) though linked, they individually complex phenomena are bound to happen in any educational system, irrespective of the implementation of any particular learning technology. In this research, a significant number of students indicated that access to recorded lectures is unlikely to diminish their lecture attendance. Instead, these resources enable them to effectively manage their learning environment and actively negotiate their individualized learning pathways.

7 LIMITATIONS AND CONCLUSION

In the last decade, Enterprise Lecture Capture technologies have increasingly become pervasive in higher education, because of their maturity and ability to capture and generate high-value content of teaching and learning activities. These technologies provide educators with flexible and innovative approaches to recording live classrooms and distributed them to students through many channels (e.g. Learning Management System).

This research broadly explored how students view the value of recorded lecture materials toward their learning. The research examined how students engage with these materials, and whether or not providing them with these materials can influence their lecture attendance. This research contributes to the growing evidence of the value of recorded lectures to student learning. However, results presented in this study should be generalized with caution, as positive perceptions of the value of recorded lectures may not necessarily contribute to improvement in learning outcomes. More research is needed to examine access analytics on recorded lectures and their correlations with student grades. In the future, it is also important to observe how students engage with recorded lectures in various forms of learning environments (formal, informal, and non-formal and online blended). Furthermore, future studies will explore how lecturers engage with recorded lectures in their teaching.

ACKNOWLEDGEMENTS

I would like to acknowledge the support of all students and staff who contributed to this project. I want to thank Emerson Pratt and Annemaree Senior for facilitating data collection.

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