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Adopting online lecturing for improved learning: A case study from teacher education

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Abstract
This paper presents the results of a study that examined the integration of video lectures into a pre-service teacher unit of study. The aim of the research was to ascertain how students used the pre-recorded videos to complement their learning. The focus was on the pedagogy, and explored three factors: convenience, self-regulation of learning and design to aid learning. A mixed method approach to the data collection was used. Data sources included reflective journals, surveys and semi-structured interviews. An analysis of the data indicates that the pre-service teachers viewed the use of pre-recorded lectures positively and that they were a useful resource for self-study. The use of a webcam was also viewed positively as a design feature of the lectures. Overall, the responses to the innovation were positive.

Keywords
online learning, pre-service teacher education, video lectures, flipped classrooms

Introduction

The use of lecture-capture and screen-capture technologies to record and pre-record lectures has garnered positive attention due to the enhanced learning opportunities for students. Current pressures on higher-education settings to provide a high-quality personalised learning experience (MCEETYA 2008) has resulted in a push to provide anywhere, anytime access to unit content (Dede 2009; Selwyn 2007; Usluel & Mazman 2009). Urged on by this change in the pedagogical landscape, many institutions are actively exploring and embracing ways to capture and make available lecture content for student learning (Kim 2009). While not intended as a replacement for in-class instruction and face-to-face lectures, the pre-recording of lectures may offer several benefits to students. There are an array of technologies available to pre-record lectures, which can provide convenience and flexibility that let students to coordinate work and study schedules. Pre-recorded lectures can be provided in a variety of modes of delivery, such as via mobile devices and laptops, and the recordings can be made available on a university's learning-management system (LMS). In this study, we used a flipped-classroom model, in which students assumed personal responsibility for knowledge acquisition in a literacy unit for pre-service teachers. The flipped-classroom model has been shown to support both self-directed learning and the unique needs of students in practice-based disciplines like education (Schlairet, Green & Benton 2014; Yoshida 2016).

In this paper, we present the results of a study that was aimed at further understanding three factors: convenience, self-regulation of learning and design to aid learning in a flipped-classroom approach. The purpose of this study was to ascertain and explore the factors that support learning via pre-recorded lectures. We contend that the drive for using technology-enhanced learning should move beyond convenience to focus on the pedagogical design of the resources.

Background

We adopted a flipped-classroom approach to the course design. The change in course design meant that students had access to the lecture content before the weekly tutorial sessions; in previous iterations of the unit, the tutorials had often preceded the lecture. The pre-recorded lectures provided the literacy theory and skills, leaving the tutorials for practical or hands-on activities. Here, for the purpose of clarity, we distinguish between lecture capture (recorded lectures) and pre-recorded lectures. Lecture capture is a term used to describe the use of technology to record face-to-face lectures and to make the recording available digitally (online) (Legum et al. 2010; Phillips et al. 2007). Lecture capture records a face-to-face lecture *in situ* using a mobile device, although institutions generally subscribe to a software provider through the room's lectern system. We focused on pre-recorded lectures. Pre-recorded lectures can be made using a range of desktop applications, and the capture software typically records voice along with cursor movement, typing or other on-screen activity within a slideshow such as a PowerPoint (Kim 2009). The rationale for using pre-recorded lectures is that while there are noted benefits of recording face-to-face lectures, such as flexible learning and reduced space/classroom pressures, the viewing of a recorded lecture hall is a second-hand learning experience that distances the student from the lecturer, course content and learning experience. In creating lectures specifically for an online format, particular decisions about how learning would be organised and online resources harnessed were made to suit the medium; these overt decisions by the researchers helped shape the study into how undergraduates used the medium to learn the unit content.

Benefits of lecture capture and pre-recorded lectures

Much of the literature on web-based lectures (lecture capture or pre-recorded) covers similar ground. Web-based lecture technologies incorporate lecture capture and pre-recorded video lecture

technologies. In terms of learning for all students generally, making sense of face-to-face lecture material and whilst recording information can be difficult. Biggs (2003) points out that during lectures students need to undertake two simultaneous tasks: "comprehending the message, and recording its gist. Most can't do this adequately" (p.117). A number of studies focused on student learning have found that making videos of lecture content available online supports learning. For example, repeated viewing of lectures has been shown to improve the learning of course content (Soong, Chan, Cheers, & Hu 2006; Veeramani & Bradley 2008). In their study of the provision of rich media materials such as lectures and videos online, Saunders and Hutt (2012) noted that students overwhelmingly found that the rich medial materials supported their learning, and that the most common uses of the media were revision and filling in gaps in information from the face-to-face lectures.

A range of benefits has been put forward on the general use of pre-recorded lectures in higher education. These benefits fall into three categories: increased convenience and flexibility; support for diverse student learning needs; and enhanced learning opportunities (Concannon, Flynn & Campbell 2005; Gosper et al. 2008; Kim 2009; Phillips, et al. 2007; Saunders & Hutt 2012). In regard to increased convenience and flexibility, students can review material at their own pace and location (Fernandez, Simo, & Sallan 2009), which results in a more personalised learning experience and students' increased sense of control over their learning (Saunders & Hutt, 2012). In the case of diverse learning needs, international students, in particular, have been shown to benefit from the opportunity to review the lecture material and engage with the language of the discipline, as well as the content of the course, at their own pace (Zue & Bergom 2010). Similarly, Balfour (2006) noted that the provision of recorded materials enabled non-native English speaking students to have repeated access to the materials to maximise their learning opportunities. Gosper et al. (2008) further found that by placing recorded lectures online, universities were supporting the needs of the large and diverse student cohorts that are now typical of undergraduate programs across many universities.

The rationale for using pre-recorded lectures, as opposed to simply lecture capture, is that the pre-recorded format may provide better clarity of the content: the lectures may be produced to a level of quality that makes them reusable learning objects, and they may provide a more personalised learning experience. It has also been shown that students who watch pre-recorded lectures with slides may be better able to apply what they have learned than students who attended only face-to-face lectures (Dey, Burn, & Gerdes 2009)). The provision of pre-recorded recorded lecture materials has also been shown to improve self-regulation, as students choose to review content in chunks, view entire lectures or skip to key concepts (Zue & Bergom 2010). The pre-recorded lecture format is created specifically for an online audience, and enables educators to embed relevant resources into the lecture for an integrated learning experience. These platforms provide educators with the capability to record a lecture together with a range of visual aids, such as PowerPoint slides, quizzes and video clips, using their own hardware (such as a laptop). Students can then access the pre-recorded lectures through an institution's LMS. When viewing the lectures, students can navigate around the recording and stop and start it at will and returning to points to view information again. Pre-recorded lectures normally require a personal license, which means the software is downloaded to a specific computer; however, this also means that educators have flexibility in where, when and how they create their online lectures. One of the key issues in the pre-recording of lectures relates to the design of the lectures to support learning.

Lecture design and the student experience

One of the key considerations of adopting pre-recorded lectures lies in the actual design of the videos. Giving students control of their learning through a flipped-classroom approach has much inherent appeal. Over the past decade there has been a concerted push in the education sector in general to promote student-led learning through multimedia. However, as Kirschner, Ayres and Chandler (2011) note, some learners benefit from learner control, while others struggle greatly. Corbalan, Kester and Van Merriënboer (2011) argue that giving students too much control may cause cognitive overload, and they even experts may experience difficulties in selecting, sequencing and pacing large quantities of multimedia-based information. Research on cognitive load and scaffolding in multimedia learning environments provides several insights into the current good practice of designing video lectures. Initially, cognitive theories of multimedia learning and research on instructional-design principles focused on techniques for reducing extraneous processing, such as placing printed text next to the corresponding graphics, reducing unnecessary words or highlighting the key material; the research has since expanded to include methods for managing more-essential processing, such as chunking of material and pre-training (Mayer 2014).

Mayer (2014) adds that research on multimedia design is now expanding to include the impact of metacognitive, affective and motivational constructs on learner engagement in cognitive processing during interaction with multimedia. That is, a small body of research is now considering learning motivation as well as design features and scaffolding. This suggests that motivation to engage with the multimedia object may be of equal importance to the design of the object. We argue that a familiar face or voice may provide this motivation, and is a point of differentiation between simply uploading a pre-existing lectures developed by other organisations (such as Khan Academy). We argue that students would prefer to access pre-recorded content that is made specifically for them than generic online lectures made for everybody.

Another design consideration lies in the amount of scaffolding needed to support learning in the pre-recorded lectures. However, there is no simple answer here. The research on scaffolding shows that there is a range of opinions about how much scaffolding is needed to support learning in multimedia environments, with Kirschner, Sweller and Clark (2006) noting that some researchers support using extensive scaffolding and others favor minimal scaffolding and support. Scaffolding in multimedia can include the offer of a range of learning opportunities, including examples for imitation, the set-up of structures to help self-monitoring, limiting choices, making cognitive process visible, providing labels to categorise and organise tacit knowledge and offering procedures that can be tailored to the learner's level and needs (Kirschner, Sweller, & Clark 2006). Scaffolding is often achieved through instructions such as written and verbal prompts, discussion templates, questioning, supported collaboration activities and modeling (Ge & Land 2004; Li & Lim 2007). However, scaffolding would appear to be a fundamental aspect of design for learning in multi-media environments, particularly as technology provides a growing array of options to make meaning through enhanced technologies and multimedia platforms. Careful scaffolding can guide the learner through the complexities of an online environment, supporting engagement with the key frameworks. This aids the development of disciplinary thinking and reduces cognitive load caused by the presentation of new content and new technology (Hmelo-Silver, Duncan & Chinn 2007). This suggests that scaffolding of the lecture-content delivery, whether by slides or other forms of visual media, needs to be considered as part of the design process. Figure 1 provides a screenshot of the pre-recorded content examined in this study. Students had the option to minimise the slides or the lecturer.

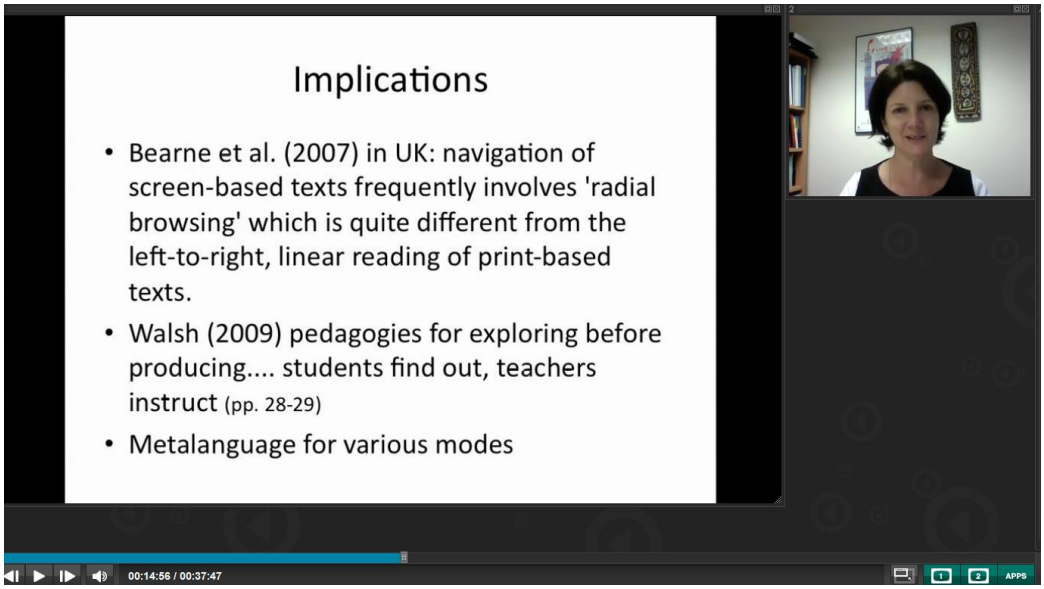

Figure 1. A screen capture of the lecture format that students viewed. Students could hide the lecturer image or presentation.

One of our central concerns was whether students would feel that the pre-recorded content was as valuable as face-to-face lectures. This is relevant, as up to this point in their degrees, the participating students had had minimal exposure to online learning. Research has suggested that students' conceptions of learning are related to their experiences; for example, Goodyear et al. (2005) put forward that how web-based learning is undertaken by students is related to the students' feelings and perceptions regarding the worth of their experiences – in other words, whether they feel that the endeavor is worthwhile pursuing. Hence, we tried to design lecture content that would be as attractive and meaningful a learning experience as a face-to-face lecture.

Methodology

Research design

This current study into online learning through pre-recorded lectures was located within an undergraduate pre-service teacher-education program in an Australian university. The subject being studied, a literacy-education unit, had an enrolment of 205 participants and formed a compulsory component of the four-year Bachelor of Education program needed to qualify as a primary school teacher in Australia. The students were in their third year, and this was the final of four language and literacy units. The academic content of the unit itself is not under investigation in this study, though the focus on multi-literacy – how visual, auditory, gestural and other meanings are made in digital texts – within the programmed content may have made students somewhat more attuned to the medium itself.

To complete the unit within the undergraduate program, students undertook a one-hour lecture and a follow-up 90-minute tutorial per week. The online component was to replace the face-to-face lecture and prepare students to interact with the content within the tutorial. Thus, the lecture was

posted on the Saturday prior to the tutorials, and students were requested to watch the lecture prior to attending the tutorial, typically within four or five days after the posting of the lecture. Notes of the presentation (the slides used in the lecture) were made available to the students, usually with key phrases or some items of information missing so that students had to watch the lecture to complete the notes. The first author had used the same strategy in face-to-face lectures previously and found it kept students engaged with the content. To reinforce the idea of the tutorial material building on the lecture content and the unfolding of content, access to the lecture was closed by the following Saturday, once all tutorials were completed, so that students were not encouraged to watch all lectures in one sitting at the end of the semester. Lectures were reopened for viewing prior to the submission of assignments that used particular material from those specific lectures. Lectures were accessed from the university LMS, using the regular student password. Lectures were streamed and not downloadable through public systems: this was to protect access and public dissemination of material.

Data-gathering

A number of technology-based projects (for example, Gosper et al. 2008 and Phillips et al. 2007) have taken a heavily quantitative focus, using large *n* samples and survey data. In contrast, thsi study was concerned with the impact of viewing and learning over time – a 12-week semester – and took a case-study approach (Yin 2003) within a "bounded context" (Miles & Huberman 1994, p. 25) to more closely track students' perceptions of their learning over time. A sample of students was approached using randomised criteria (every 12th student on the class list) and invited to participate. Of these students, eight accepted and completed all data-gathering instruments, and 12 completed most instruments. At the end of the semester, all students enrolled in the unit were offered the opportunity to complete an end-of-unit survey about their experience of using this new lecture format; 84 participated, as either individuals or a group, resulting in 35 surveys. Table 1 summarises the instruments used and the number of participants.

Table 1. Data-gathering instruments within the study

Instrument		Number of participants	Time
1	Viewing journals	12	Every two weeks, submitted after viewing
2	Interviews	8	After week 6
3	Survey	84	Last tutorial or in following week if accessed online

The instruments chosen for the study were designed to generate a "thick description" (Geertz 1993) so that the researchers could attempt "to make sense of, or to interpret, phenomena in terms of the meaning people bring to them" (Denzin & Lincoln 2000, p.3). This was important to the researchers in terms of discovering how students were using the technology for learning the unit content.

Due to ethical issues around researching students within the unit being taught, the two researchers took on particular roles. The second author, who had not been previously known to participants and was located at another campus, took on the data-collection role, anonymising submitted journal pages (instrument 1) and conducting the interviews (instrument 2) with pseudonyms. To further protect students, the survey (instrument 3) was conducted in tutorials that were not taught

by the teaching researchers. Students in the teaching researchers' classes were invited to complete the survey at another time and submit to the non-teaching researcher, though many did not as the semester had finished.

Viewing journals

The participants completed a fortnightly journal page (Appendix), either online or in hard copy, and submitted it to the second author the week after viewing the lecture. The journal page asked for comments in four areas, derived from the literature around use of online learning in regard to issues of convenience, learning and design (although the discussion in this paper is largely concerned with the second, third and fourth points):

- Technical aspects, to discover what technology participants used to access the medium
- Viewing behaviour, to understand what participants did while viewing and how these behaviours might contribute to learning
- Perceived learning, to gauge what participants understood by their learning and any links to the medium
- The lecture format, to understand the impact of the medium's features on participants' engagement with their multi-modal learning.

For some questions, participants were asked to give comments or generate percentages. These percentages were used to provide an understanding of how students ranked items in descriptive terms, and the instructions suggested that the numbers did not need to add up to 100 per cent.

Interviews

After week 6 of the semester (halfway through the project and after participants had completed three journal pages), semi-structured interviews were conducted with those students who were available and willing to speak further about their experience with the lectures. The interviews gave students the opportunity to expand on the themes of the journal data – using the four areas of technical ease, viewing behaviour, perceived learning and lecture format – and explored any other issues not covered by the researchers' themes. Giving students the opportunity to speak about their experiences using the platform sought to explore the underlying meanings of actions and activity (Merriam 1998) around the use of the format, which had been new to most students.

Survey

The final data instrument was a survey conducted in seven tutorial groups that represented 84 out of the 205 students in the cohort. Survey submission was voluntary and could be completed in a group (with number of participants noted) or individually. This generated 35 surveys and some indication as to how many students' opinions were represented by each survey. The questions were similar to those given to the focus group that had completed ongoing journals so that the larger *n* responses could validate those of the smaller sample.

Data analysis

As part of this study's qualitative approach, the data derived from journals, interviews and surveys was coded for themes that emerged and grouped to discern patterns and connections. Simple numerical analysis was applied, deriving percentages from the larger sample of student responses in the survey to compare to the more descriptive data from the journals and interviews. From this we derived a picture of how students in this unit of study were interacting with the medium and to what degree, and in what areas, they perceived that their own learning was enhanced (or not) through the use of lecture-capture technology.

Discussion of Results

This section provides a discussion of the results. The findings reported here are derived from the data instruments and are organised around themes that were prompted by specific questions or that emerged from close analysis of student comments. The focus will not be so much on the individual instruments, but rather on the location of particular findings across the data. The researchers were interested in how the students in this unit of study went about using the technology on offer and their general attitudes and disposition toward its use, mainly as a way of understanding how students organised their learning around this new format.

One of the areas of interest was how the students accessed and viewed the lectures. We wanted to know if they watched the lectures individually or in groups. While traditional face-to-face lectures brought everyone into one space with many viewers, the surveys indicated that nearly 96% (n=33) of the students surveyed viewed the lecture by themselves, rather than gathering with others around a computer. Only two students reported watching it with a friend (presumably each other). Eighty percent (n=28) watched the lectures at home, with "at university" being the next often-used venue at 17% (n=6) of the sample. These percentages were similar to those found in the group that kept the regular journal: only one student reported watching lectures with another person (in this case, a family member and not a student in the course). The journals further indicated that the lecture was typically viewed two days before the lecture. A number of these students tended to set up patterns for viewing: on a Saturday morning; after a Friday work shift. Students appeared to be incorporating off-campus viewing into their home and work lives, accessing and watching the pre-recorded lectures by themselves at a time and location that was convenient to them. Given that they were third-year students, they were familiar with the LMS and the course requirements.

Another area of interest was the students' reposes to the provision of pre-recorded lectures. Overwhelmingly, the response to offering online lectures was positive, with 81% (n=29) of respondents in the survey preferring the format. Positive comments from this source included:

> *It was truly exceptional.*
>
> *I took in more than I usually do.*

Not all of the students liked the format, with 11% (n=4) expressing a preference for face-to-face lectures, encapsulated in the comment:

> *I didn't apply for online distance uni[versity].*

Eight percent (n=3) expressed little preference either way, regarding format as immaterial, as this comment suggests:

> *Quality education is ever compromised no matter what shape or form it is in.*

Overall, the response to using the online lectures was positive. This is similar to findings in other studies (Gosper et al. 2008; Veeramani & Bradley 2008) that showed a positive uptake of the online format by students within undergraduate programs, often for reasons of convenience and access. While the physical use and disposition toward the medium was interesting, this had been shown in other studies. The researchers were primarily interested in the effect of the medium on students' learning and how the students could use the technology to increase their own interaction with the unit content. Three strong themes emerged from the student responses: convenience for learning; the ability to self-regulate learning; and the format design to assist learning. While convenience will be mentioned, themes will be discussed in terms of how students identified an increase in learning opportunities.

Convenience

The theme of convenience has been highlighted in other studies (Smith et al. 2009; Veeramani & Bradley 2008), which have largely found that students identify practical value in being able to view a lecture in their own time; certainly, the findings from this study support these earlier studies. However, what was of interest in this study was how students saw convenience as a factor in being able to learn the content. From the survey data, when asked what they liked about the lecturers, 80% (n=28) of students mentioned choice of time and 29% (n=10) mentioned choice of location as positive factors. Many comments referred to learning considerations:

> *I was able to watch the lectures in my own time and plan a schedule that worked...I wasn't forced to cram!*
>
> *[Learning was] possibly enhanced because there was no pressure to be at the lecture on time, no parking issues and I could focus on the lecture at a time most convenient for me*.

This response recognised the learning benefit of being able to take the time to engage with the material. Similar comments emerged from interviews:

> *I watched it when I was really tired [and] I don't think I got everything. That's a good thing about…if you're tired you can watch it again.*
>
> *I think that's a better way than having to come to uni and spend an hour and a half here and an hour in traffic.... Yeah, so I think it's a lot more effective.*

When students did react negatively to the format, their comments in relation to convenience were more centred on the fact that there was no choice about using the format, that it was only available online. This comment from the survey, in fact, shows a preference for face-to-face lectures, with the option of each lecture being recorded:

> *Face-to-face lectures should be recorded so that we can choose as suits personally*.

Students did not mention any ways that the flexibility of time and location detracted from learning, just that they were compelled to use the particular format. However, given academic workloads, the provision of course content across a range of platforms is often not an option for academic staff.

Self-regulation in learning

An element of students' experience that recurred across all the data was the ability to regulate their own learning through manipulating the pace of the online material, something that face-to-face lectures could not offer. Other studies on university students' interactions with web-based learning have shown that students with higher-order conceptions of web-based learning (seeing in a new way and understanding) had significantly higher self-efficacy toward web-based learning than those with lower-order (Tsai 2009). In response to the survey question "Was there any advantage to being able to pause it and replay parts of the lecture? And if so what?" Twenty-eight percent (n=9) offered the response that being able the control the lecture was a benefit:

> *In normal sit-in lectures, once you miss the point that the lecturer is making, you can't go back and listen again.*
>
> *Didn't have to rush out, go at your own pace. More personalised.*

Table 2 shows students' most common responses about the advantages of the lecture format, in which students indicated perceived opportunities for improved learning. These included being able to go back and access information missed in the initial access to the lecture and being able to clarify information.

Table 2. Responses about advantages of the lecture format

To pause and go back to pick up missed information	37%
To understand better or clarify	37%

To elaborate notes	20%
To identify key points	17%
To have sufficient time to write notes	20%
To be able to take a break, particularly when interrupted	20%

One of the interviewed students described her behaviour using the online format to assist her own learning:

> *At the end and sometimes, like, I'd pause it and then go back a bit, because, you know, when* [the lecturer] *keeps talking…I think I found it hard to keep notes and take, and keep listening to her, which is why I paused…. The beauty about having your lecture online, you can pause it, rather than in a lecture hall, you missed it and it's gone*.

Again, the negative responses were more centred on the fact that students were compelled to use the online platform rather than on any particular reason connected to compromised learning. Of the 54% (n=19) who indicated dislike of the self-regulation format required, survey responses included the following:

> *You had to factor in your own time to watch it. I'd prefer to go to a lecture room and watch and listen in the lecture hall*.

One comment noted the ease of being distracted by other things:

> *More compelled to not watch the lecture rather than play it and go off and do something else whilst it's running.*

One interview respondent noted the temptation not to engage:

> *It's too easy to get slack or just kind of walk away, or go down and do other things…. I mean I didn't really discipline myself to have an approach to do it, or write notes about it, or anything like that. No, it was just when I had time, basically*.

Two of the interview participants noted their preference for being made to come into university:

> *I think the [face-to-face] lectures are far better. Even if it means I have to drag my sorry arse to sit down in the lecture and stop whatever I'm doing and focus, but you did*.
>
> *I need to be structured; otherwise I don't do it*.

It would seem that face-to-face lectures represented more compulsion to attend, even though there was no way of checking attendance at these lectures or ensuring that students were listening, particularly in light of the access to internet and other distracting media that make their way into lecture halls. Those who expressed a preference for face-to-face lectures largely wanted to be compelled to attend even if the reality as that they still could not be compelled to listen.

Those who were positive about the online lecturers pointed out the particular personal qualities needed to use this resource:

> *It allowed us as teachers to take our own initiative to view these lectures.*

However, as earlier comments revealed, this opportunity for self-regulation did not suit every student's learning style; this supports the findings of Tsai (2009), Mayer (2014) and Goodyear et al. (2005), all of whom found that individual factors affected students' motivation and ability to engage with online learning content.

Design for online learning

One of the chief considerations for the authors in creating the lectures for this format, rather than for the large lecture hall, was considering how to harness the strengths of the medium to make the lecture an online product. We wanted to see how the students responded to each facet of the design

of the lectures. As lecture-capture technology often merely recorded what was done inside a lecture hall, it did not cater for the students who viewed the lectures by themselves off-campus. Instead, the personal capture format meant that the lecture could be constructed to connect directly with the home viewer in mind, requiring a different orientation to the task. As this was still a new format for the first author after years of lecturing to large groups, the results were of particular pertinence in ensuring that the medium would engage students in learning the unit content. Questions across all instruments targeted how the design of the presentation assisted learning.

One feature that the authors considered in designing an online presentation was having the lecturer (first author) herself visible, rather than a disembodied voice. This familiar face and voice was an aspect of the design that students most connected with: 56% (n=20) of survey responses nominated this as a positive feature of the medium. Using a close-up camera shot brought the lecturer – and the lecture content – closer to the students than a traditional presentation in the lecture hall space.

> *Watching online made it easier to see her as you are not as far away*.

In his interview, one student highlighted the appearance of eye contact in the personal capture lecture as particularly significant:

> *I don't know if it was the eye contact.... Yes, so I noticed that she'd made a lot of effort into her approach that's she's actually talking to the room, rather than, sort of like, "Blah, blah, blah", looking elsewhere, or looking down at her feet, or sipping coffee or something* [laughs].

Survey comments also identified the various ways of making meaning in the lecture: watching the slides, watching the lecture or listening to the lecturer.

> *Being able to choose what we looked at – e.g. we could watch [the lecturer] talk, listen to her and watch the slides in any combination – so it is up to the individual watching.*

The multimodal aspect of the presentation was brought out in interviews as well. In these chances to provide longer answers, students articulated how the experience worked for making meaning of the content:

> *I think the way our screen was set up, that the slides were the main focal point, because, you know, rather than, you know, it being [the lecturer], the slides being down here, it makes them, makes it feel like that's the important part. But then you can still make the connection with [the lecturer], and I think you definitely need all three, definitely.*

One of the student's that was interviewed compared the personal capture medium to the more usual experience of recorded lectures that only contained slides and the lecturer's voice, often taken from the face-to-face lecture:

> *I had another unit that's done where she's just recorded the voice and had the power point slides.... And I, sometimes I like this [personal capture].... I find it a bit more engaging if I can see the lecturer there, rather than just hear their voice...something about it, seeing the video is good.... It sort of made it feel like she was actually there talking to you then and it was a lot more engaging for me. I like to be able to see that someone's looking at me when they're talking to me, and so, yeah, I found it [to be on a] more personal level.*

In interviews as well as the survey, students raised the issue of being "engaged" in the content, typically the aim of lecturers in relation to the content they are teaching. The responses support the research on design and scaffolding; in particular, the findings of Mayer (2014), Kirschner et al. (2011) and Goodyear et al. (2005).

In analysing their own behaviour over time through the ongoing journal activity, some students displayed particular preferences for some modes that the pre-recorded lecture afforded. Some participants rarely watched the lecturer at all, but used the voice or slides as their main source of

content. One student regularly recorded that she only watched the lecturer at best 10% of the time, one week 2% of the time and generally never, with most of the time (between 70% and 80% over the five journals) spent looking at the slides. In the written notes for the third journal entry, she explained her behaviour:

> *[I] was making notes of what extra information [the lecturer] was giving to us that weren't on the slides. I still needed to look at the slides to understand parts of what she was explaining, e.g. the marking up of the text – you have to see how she did it to understand.*

Similarly, another student rarely watched the lecturer (between 5% and 20% of the time), but relied on listening in every lecture, noting that she multi-tasked throughout the lecture, as explained in the first entry:

> *As a busy uni student, I feel the need to do as many things at once as I can. I was doing random things such as checking emails, looking at the assignment and also writing anything that I felt necessary while listening to the lecture.*

Realistically, this is what many students with mobile devices (e.g. phones and laptops) within a face-to-face lecture are doing in the lecture room, dropping in and out of the lecture while spending time checking their phones and social media and talking. The closest this student came to full attention was in the final journal entry:

> *Concentrated on lecture then checked a few emails at one point.*

Other students were relying more on watching the lecturer. One, for example, identified that she was watching the lecturer up to 90% of the time, dropping to 50% in the fourth journal entry:

> *Half the lecture I watched the lecturer, the rest of the time I was listening while either watching the slides or writing further notes.*

More typical of other students, she recorded journal entries indicating that she regularly watched the lecturer:

> *Times I was listening only was when I was making notes. Majority of the time was spent watching the lecturer and accompanying slides.*

Likewise, another student spent most of her time (approximately 90% to 100%) watching the lecturer, explaining in her second entry:

> *Busy watching the lecturer but did glance and read the notes first and every now and then throughout the lecturers explanation. I personally find it a lot easier to grasp the concepts when you can see the person who is talking (not many lecturers who do podcasts from home do that, which is a shame).*

For her and other students, the appearance of eye contact made possible in this online format enhanced the experience of learning the content. This supports our premise that students respond to the personalisation: they prefer to see and hear their lecturer, whom they know.

The concerns of those students surveyed who did not like the online lecture format were that face-to-face lectures were more engaging and perhaps more appropriate for the context of the activity, as indicated by this comment:

> *Recording face-to -face better than recording in an office space.*

An interesting comment that was made in several places was that of extended viewing. Although the recorded lectures were the same duration as face-to-face lectures, and sometimes shorter to reduce content overload, one survey respondent noted:

> *Hard to concentrate for long periods.*

However, since the online format meant that viewers could pause or take a break more easily than being in a face-to-face lecture, the student indicated that they are not willing to take the break that the online format affords. The student may have merely been suggesting a general dislike of the format. Two students in the focus group were not positive about the online format overall,

preferring face-to-face lectures for the "connection" that is made by being in the same space as the lecturer. One said:

> *I need to have that interpersonal or that face-to-face contact so that I pay attention.*

Another student expressed the same need in an interview:

> *I'd much rather be with, you, know, human to human. I find it's much better for my learning and stuff like that.*

It should be noted that this last student was the only one of the focus group to experience technical difficulties that meant he was not able to view the video; this made it difficult to ascertain a true reaction to the format. While a majority of students in the focus group and across the cohort were positive about the online lecture, it must be acknowledged that there are going to be some students who are alienated and disengaged by such modes. This may be initial resistance or a deeper alienation due to the relationships being set up by the form itself. The challenge for lecturers is to use appropriate design strategies that may lessen the virtual "distance" between the teacher and student.

Conclusions

For lecturers trying to provide the means to present quality education in an online format that enhances student engagement with academic content, this study presents some salient points about designing lectures to meet the needs of the current cohort of university students. This cohort is generally tech-savvy, is engaging in multi-modal online experiences in their everyday lives and is juggling myriad commitments: the days of the university student whose sole activity is attending classes are not the present reality in most societies. In providing lecture material, the design not only is in the unfolding of content, but takes into account how the content might be viewed online. We found that students largely responded positively to the familiar: the face and voice of their own lecturer. This puts forward support for Mayer's (2014) argument that the emotional motivation to engage with multimedia content may have as much impact on learning as the design itself. Thus while cognitive load and scaffolding are important considerations, so is the emotional connection to the multimedia. This also supports the argument for pre-recording lectures for student cohorts rather than accessing ready-made, but generic, content online.

The new forms of personal capture present the opportunity, as well as the challenge, of designing lectures that speak to the viewer more directly, making eye contact across cyberspace and lessening the visual space between lecturer and student. In fact, this may be more possible than in the face-to-face lecture, where the lecturer can represent a dim, distant figure behind the lectern. Embracing the format means speaking to the students, acknowledging that they are elsewhere, but also that they have the potential to use the online location to go to links, pause and consider questions or use the environment within which they are watching: "You might look around you and notice..."; "You might like to pause and follow this link before continuing". As a first-time user, the first author chose to keep the new technology simple and uncomplicated, cognisant that students were also using this format for the first time. Other formats may provide the scope for opening internet links within the lecture, embedding quizzes and using other interactive elements, many of which may enhance the students' learning of various content areas.

With regard to further research directions, we aim to extend this study to explore how students respond to a flipped-classroom approach for content that is deemed difficult for pre-service teachers to master (such as mathematics and grammar). What this study did not do was compare the experience of this lecture format with the success of students in the unit. Participants' final results were not analysed against lecture use; this study, therefore, makes no claims for the overall learning. What it does indicate is that students interacted with the material in ways that are not

possible in the face-to-face mode and in ways that lecturers would generally encourage: reviewing ideas, taking notes, listening to the material. As one survey respondent noted:

> *I took in more than I usually do*.

Another comment was more specific in terms of the question of compromised learning through the online format:

> *Honestly, there was no disadvantage. You got to see [the lecturer] online, the lecture notes were provided and she explained everything well without it being face-to-face.*

None of the responses, through any of the instruments, articulated a feeling of compromised learning; in fact, many students could articulate ways in which learning for them had been enhanced, even if it was just that they could follow the lecture in their own time. While we are not offering a failsafe method for online learning, we hope that this study may provide further insights into the value of personalised pre-recorded lectures in pre-service teacher education. As universities move to enact technology aims as well as meet the quality imperatives of higher education as mandated by bodies such as the Australian Qualifications Framework (AQF) and the Tertiary Education and Quality Standards Association (TEQSA), moving into online lecture formats may enhance student engagement with course material, as long as the focus is not so much on convenience as on designed-in aspects to enhance the learning experience for higher-education students.

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Appendix

Fortnightly journal

JOURNAL PAGE				**Participant code:**
Week	Planning for literacy learning			**Tutorial day**
Technical aspects for this week	Did you use a PC or a Mac?	Any glitches in the system? If yes, how annoying?		
Your viewing behaviour	How much of the lecture did you watch? mins	When did you watch it (day, time)?	_____day _____am/pm	
	Where did you watch the lecture?	Watch it by yourself or with anyone else? Who (not names!)?		
	Did you pause or play any bits back? Can you explain what you did and why you did that?			
Your learning from the lecture	How much of the content do you feel you understood? %	Did the talking and the written information seem to link together?		
	Give a percentage of how much each of these helped you understand the content (doesn't have to = 100%...think about how much each helped)	The slides _____%	What the lecturer said _____%	Anything else you can think of that worked for you _____%
The lecture format	What did you do most or least of: watch or listen? Give a % of the time	Listen to the lecturer speaking _____%	Watch the lecturer speaking _____%	Watch the slides _____%
	Can you give reasons for why you did this (e.g. was busy making notes, was doing something else at the time)			
	Was there anything the	Anything the		

	lecturer did that made you not want to watch?	lecturer did that made it easy to watch/you wanted to watch?

Survey for students

FINAL FEEDBACK about ONLINE LECTURES Please respond to these questions as best you can. You can answer in a group or on your own. Don't use names!							
Where did you generally view the lecture (at home, uni library etc.)?				**Did you generally watch it alone or with a friend?**			
Person 1		**Person 3**		**Person 1**		**Person 3**	
Person 2		**Person 4**		**Person 2**		**Person 4**	
Was there any advantage to being able to pause it and replay parts of the lecture? Why/why not?							
Thinking multimodally (voice, gesture, spatial, written, colour etc.), what pluses or minuses can you say about the online format and the lecturer's presentation?							
Compared to a face-to-face lecture, what was/were the advantage/s of this lecture format?							
Compared to a face-to-face lecture, what was/were the disadvantage/s of this lecture format?							
Was your learning enhanced or compromised by using this format? How?							
Are all group members willing for these comments to be used in the study?							**YES/NO**

Have you **each** signed a consent form?	**YES/NO**
Thanks for participating in this activity. Please email this directly to name@institution	