The pedagogy-technology nexus: Bridging the divide between academic and student perspectives on educational technologies

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This paper reports on the early findings of a research study into academic design practices when incorporating educational technology. As part of the overall project, students were questioned on their perceptions of the use of technologies in the course. The insights gained from the students are discussed within the parameters of three major themes that emerged from the data informing implications to practice in academic development and learning design.

Introduction

Critical proponents argue that students and their perspectives can often be overlooked in discussions on educational technology and pedagogical innovation (Conole, De Laat, Dillon, & Darby, 2008; Selwyn, 2014). At the 2012 ASCILITE conference in Wellington, we learned that in the Maori language they have a single word, ako, to represent teach and learn. It served as a powerful reminder that students and teachers have an equally important role to play in our educational environments. As we move towards more student-centred learning environments, it is important that those designing these environments understand how their students want to learn rather than directing how they should learn (Ellis & Goodyear, 2010). As such, it is vitally important that as an academic community we engage in research that brings us in direct contact with the student voice as major participants in the learning-teaching nexus, a position that is exemplified in this year's conference theme of *Me. Us and IT.*

Background

The use of technologies is integral to universities in their delivery of learning and teaching activities. Many argue that it has yet to completely transform educational practices largely because the introduction of technology alone cannot change people's practices (Flavin, 2012; King & Boyatt, 2015; Livingstone, 2012; Selwyn, 2014). For academics, a contributing factor to this may have been that academic development programs for technology adoption were largely based around the acquisition of technical skills rather than the pedagogical use of these technologies (Dondi, Mancinelli, & Moretti, 2006; Garrison & Akyol, 2009; Kirkwood & Price, 2006; McCarney, 2004). It has only been in the last decade that there has been a call to move academic professional development towards the pedagogical application of these tools (Cochrane, Black, Lee, Narayan, & Verswijvelen, 2013; Glover, Hepplestone, Parkin, Rodger, & Irwin, 2016; Macdonald & Poniatowska, 2011; Shephard, Mansvelt, Stein, Suddaby, Harris, & O'Hara, 2011).

Research now tends to concentrate on where pedagogy and technology connect as a way to drive innovation and an emerging area within this body of research is the investigation of academic design practices (Bennett, Agostinho, & Lockyer, 2016; Kali, Goodyear, & Markauskaite, 2011; McKenney, Kali, Markauskaite, & Voogt, 2015). However, the students' experience has not always been considered within these designs. This is highly problematic as Bennett, Agostinho, and Lockyer (2015) found that assumptions that teachers have about their students were the strongest influence on their design practices. Consequently, it is important that more research in the area of academic design practices is conducted to understand the student experience within technology-enhanced learning environments. The use of student voice within these design practices can shape and/or challenge these assumptions and align the learning-teaching nexus.

Methodology

The research presented in this paper is part of a larger explanatory case study investigating the issues surrounding the pedagogical challenges academics face when designing and delivering courses that incorporate

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technology. To date, research conducted in this area has relied on interview data, or self-reports from either staff or students, which do not provide a complete picture of "design and delivery practices" (Bennett, Thomas, Agostinho, Lockyer, Jones, & Harper, 2011, p. 165). As such, the larger project involves multiple sources of rich data collected from course documentation (course profiles and course sites) as an objective presentation of the design and delivery, as well as interviews with the academics and the students in the courses. In total, five academics were selected from an analysis of responses to an adapted TPACK survey that was sent to academics responsible for the design and delivery of courses at a large-scale Australian university. Each of the five academics was asked to nominate one course for the purpose of this in-depth investigation.

The data reported in this paper represents the student focus groups that were conducted to understand how the pedagogy-technology nexus is understood and experienced in the selected academics' courses. Focus groups were selected, as the best method in capturing a range of opinions from several groups (Krueger & Casey, 2000) in their own language and in how they understand the world (Kitzinger, 1994). Focus groups were conducted, through a voluntary invitation to participate, after the last tutorial or synchronous activity that occurred in the teaching schedule for that course. This allowed for general sampling to occur and, the timing at the end of semester, leveraged the sense of cohort that had been built throughout the course to create a "comfortable and permissive environment" (Krueger & Casey, 2000, p. 9) for participants to freely express their opinions.

As the overall project is still ongoing the data reported here represent sessions conducted within three different courses delivered in the 2016 academic year. Table 1 describes the attributes of the three courses in terms of topic, delivery mode, student enrolments, year level, and response rate to the focus group session.

Table 1: Attributes of the three courses in terms of topic, delivery mode, student enrolments, year level and response rate

Identifier	**Course Topic**	**Delivery Mode**	**Number of Enrolled Students**	**Year Level** Under graduate = UG	**Response Rate**
Course 1	Cell Biology	Mixed Mode	27	UG, 3rd	32%
Course 2	Language and Technology	Online	22	UG, 3rd	11%
Course 3	Exercise Science	In Person	188	UG, 3rd	1%

The student focus groups were between 20 to 42 minutes in length and had between three to seven participants in each. The sessions for Course 1 and Course 3 were run face-to-face and Course 2 was conducted in the synchronous online environment, Blackboard Collaborate, and involved students typing their answers to the interviewer's spoken questions. The focus group sessions were conducted as semi-structured interviews and students were asked to talk about *the technologies that were used in course, how effective these technologies were in supporting their learning*, and *how technologies may have hindered their learning*? These questions mirrored the questions that were used in the academic interviews.

Analysis of the transcriptions was conducted using a deductive approach through the application of a pre-defined codebook (Miles, Huberman, & Saldaña, 2014). Two theoretical educational frameworks were selected as they provide a way to talk about pedagogy in relation to technology in the design and delivery of educational experiences. These frameworks, which are represented in Figure 1 and Figure 2 respectively, are: Technological, Pedagogical and Content Knowledge (TPACK) model (Mishra & Koehler, 2006) and the Community of Inquiry (CoI) model (Garrison, Anderson, & Archer, 2000). The need to use two frameworks is due to the nature of their utility in the specific elements under investigation. TPACK (Mishra & Koehler, 2006) was selected because its research instruments focus on describing current usage of technologies rather than judging attitudes towards technologies (Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009) and CoI was selected as it can be used to measure the development a community of inquiry within courses (Garrison, Anderson, & Archer, 2010) and determine student perceptions of this development (Swan, Day, Bogle, & Matthews, 2013).

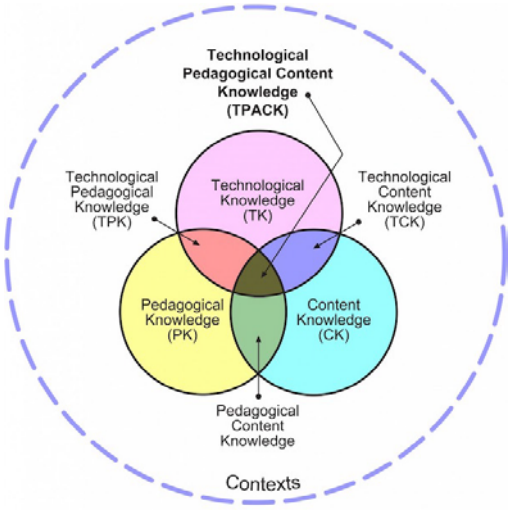

Figure 1: TPACK

Figure 2: CoI

The codebook was developed by adapting previous qualitative analytical codes used within the bodies of TPACK (Koh, Chai, & Tay, 2014) and CoI (Garrison et al., 2000; Rosenberg & Koehler, 2015) research.

Findings

The study has currently investigated three courses (with another two courses to be investigated in 2017) and has had a total of 14 students involved in the focus groups being reported in this paper. While this is a very limited sample size the data collected so far has offered some interesting insights into student perceptions in operating within their learning environments and how technologies are used to foster their engagement. These findings will be organised around three themes that emerged from the data that are indicative of components of both frameworks: sense of engagement, regulating learning, and technical knowledge. Alphanumeric codes have been used to simplify the presentation of results. For example, Course 2, Participant 5 is coded as C2P5.

Sense of Engagement

As learning and teaching activities move more online, academics struggle with building social presence with the absence of face-to-face interactions with students and are having to re-interpret what student engagement means in these environments (Roby, Ashe, Singh, & Clark, 2012). The following excerpt, where students talk about their classes within the synchronous online tool, Blackboard Collaborate, indicates that students potentially do not have the same struggles.

C2P5: *the chat window has been really helpful in getting all of us to participate*
Interviewer: *ok…so it's been a great participation tool?*
C2P7: *It has enabled me to virtually attend classes. There aren't too many things that you can do in a physical class that you can't do here.*
C2P2: *It was pretty much our lecture that you would normally have in a classroom but being online makes things a bit different. I know I for one have spoken more in this class than in any other class I've had*
C2P7: *true [#P2], I agree*

This exchange highlighted the importance of the chat feature to the students and their preference towards this medium over the use of the audio and video tools within the system. Students reported that it gave them the freedom to contribute more than in a traditional face-to-face teaching space. It also showed how the students did not perceive any diminished experience with learning online than learning in a face-to-face context.

The traditional lecture space and the nature of student engagement is also a highly contentious area within the research as academics perceive that the availability of recorded lectures is affecting student attendance at the live lectures (Green, Phillips, Gosper, McNeill, Woo, & Preston, 2007). In fact, it was found that the students who attended the lectures were most likely to watch the recordings (Green et al., 2007; Larkin, 2010; Leadbeater, Shuttleworth, Couperthwaite, & Nightingale, 2013). However, in their review of the literature, O'Callaghan, Neumann, Jones, and Creed (2017) found more often than not, students rely on lecture recordings to review key points or to fill gaps in their note-taking during the live lecture. This was evidenced in the data collected from Course 1 and 3 where comments were made on lecture capture used as "a *reinforcement* (C1P4)" but also revealed some student strategies to increase their cognitive engagement with the material presented in these lectures. One student in Course 3 reported *"the way I use lecture capture is, I get bored in lectures, so I speed it up. It actually engages my learning a heap more…..actually have it as like a hectic study session. I'll all the time daydream in class, but when I put it on two times speed, I can eliminate that* (C3P5)." By listening to the lectures back at double speed, this student could tell where the academic wanted maximum engagement as the student reported "*when you do it at fast speed, you actually get were there are emphasizing a heap better….you can see when they're actually wanting to skip over stuff. Chances are they don't really want you to know that* (C3P5)." This indicates that the student was not only exhibiting the review behaviors found in other studies but was using the features of the technology to increase their own cognitive engagement with the material.

Regulating learning

The data collected showed how students relied on multiple digital platforms and resources to help regulate their learning; within the designed structures provided by

the academics, and for themselves. Studies into student behaviours with digital technologies reveals that students do rely on digital technologies to support their practice of "reviewing, replaying and revising" (Henderson, Selwyn, & Aston, 2017, p. 7).

One such way was the use of the Learning Management System (LMS) course sites to help them structure their studies and keep on track. In Course 1, which had a highly structured course site, a student referred to the LMS as their "*bible* (C1P4)" while another student agreed "*its just like the central hub for everything* (C1P2)" where they could go to "*see what we have to do this week, what's next week* (C1P4)". In Course 2, the students appreciated how the academic laid out the course site (again with a weekly structure with all the materials) and how effective the use of various tools they were exposed to that taught them new functions of the system. In Course 3, which had very little structure or content within the site, the students were slightly frustrated as the digital platforms felt like a "*puzzle piece* (C3P5)" with "*some stuff in the course profile, some stuff in announcements* (C3P5)" or they "*hide it in the lab book* (C3P3)". The students in this course felt that it could be made clearer. These findings indicate how important the structure of the LMS course site is to students, and while organisations may require certain information to be in other platforms (i.e., course or unit outlines), students expect this information to be replicated within the LMS in easy to follow structures.

Another way students rely on the digital platforms to regulate their learning is to use multiple forms of resources to address any gaps or any deficits in provision of content. This is evidenced in the following exchanges between the students in Course 1 who relied on the multiple resources (YouTube, Lecture Capture and lecture slides) provided by the academic to supplement deficits in the provided materials or to follow their own learning styles.

C1P2: *She tries really hard to make sure there's always lot of different-*
C1P4: *Lots of different options*
C1P2: *Lots of different options for you to take home learning, 'cause she obviously understands that people learn differently.*
C1P4: *Yeah, some courses just put up your lecture notes, then if the lecture records well, that's good, and that's it, some lecturers don't put effort into giving you extra resources or more available electronic……her slides are very comprehensive as well, the lecture slides that she uploads. So if you can't actually hear what she's saying on the Capture, you don't understand in the class, you can go back and read them and get all the information you need from her slides.*
Interviewer: *How do you think YouTube particularly helps you learn in this course?*
C1P2: *To pretty much clarify-*
C1P6: *To solidify what you've done.*
C1P3: *Maybe a little of extra detail, if you are really interested.*
C1P5: *'Cause it gives it from a different person's perspective, like if you don't like the way [teacher] actually lectures, then you hear it from someone else who lectures a different way.*

The students in this course were able to overcome the problems in the use of the lecture capture system for review purposes (because the audio was insufficient) by relying on the multiple visual resources provided to them. This aligns with other findings into student digital behaviours that found that students sought external video content to supplement their studies (Henderson, Selwyn, Finger, & Aston, 2015).

Technical knowledge

Technological competencies, of both the staff and the students, were another major theme that emerged from this data when students were asked how technologies hindered their learning. First, students in both Course 1 and 3 talked about the deficiencies with the use of lecture capture by the teachers. The following example shows how important the quality of lecture capture recordings is to the students using these as revision tools.

C1P2: *The lecturer doesn't really know how to use the microphones for things, so the Lecture Capture didn't work at all.*
C1P3: *Hmm, I still don't see that [teacher] ever used microphones.*
C1P4: *Or if you have one that doesn't know how to use them.*
C1P2: *Yeah. She doesn't use the clip on microphones, so when she walks close to the desk it always gets louder, and when she walks away-*
C1P2: *She relies on the in built microphone on the computer.*
C1P4: *Which is fine if you're attending in person. But if you have to rely on so much of the Lecture Capture, it's difficult, I guess.*
C1P 3: *So she'll walk back and the volume goes like, "WhooOOOOMM"*
C3P2: *I think that lecture capture should be a good revision tool. Not using the microphone because you want to wander around is not good enough at the end of the day. You're the teacher, and your students should be able to revise. I know*

that sounds really hard, but personally, I think it should be a thing.

The following exchanges highlights how the quality of the lecture capture can also be affected by the other media and strategies that academics deploy during a lecture. In Course 3, it was the way the academic structured their slide presentation.

C3P3: *Yeah, lecture capture are pretty iffy sometimes.*
C3P2: *The slides are always super brief. If you miss anything, you have no idea what the point is of that particular slide like… like It's graph…what am I looking at?*
C3P4: *I might go back to the audio of the …*
C3P2: *Yeah. Then if audio's not up to standard, because like you said, there's no mic, you're left in the dark.*
C3P3: *You've got to try and interpret the graph. At the same time, I do like that method of teaching, because it actually gives a reason to go to a lecture and actually watch her explain the graph, rather than just going and watching some guy reading lecture slides for two hours, when you could have just sat there at home and read the lecture slides.*

In Course 1, it was the academic's use of the whiteboard, which is not captured through the lecture capture system, over using the provided digital overhead projector, which is captured.

C1P6: *Sometimes lecturers draw on boards, and do equations on boards, you can't see that. Sometimes it can really be the key thing that makes you understand it. You gotta be there to see it, or you're at home just listening to it to try and work out what she's doing on the whiteboard, or something like that.*
C1P5: *That's actually a really important point*
C1P2: *In this course, or-*
C1P6: *Well, every course.*
C1P2: *I think it would be better if it became like a compulsory thing for lecturers. 'Cause it's not just her. There's plenty of lecturers that do it.*
C1P6: *Oh, it's every lecturer.*
C1P2: *They should learn how to use the projector*.
C1P4: *That's right next to every computer*.

These examples indicate there is a divide between the academics understanding of how students use these lecture capture recordings to support their learning. The academics' technological knowledge and how this connects to their pedagogies, teaching in digitally-enabled spaces, may be limited and this is impinging on the preferred learning behaviours of the students.

Second, the students also talked about some of their own limitations within the digital learning environment. This theme arose around discussions of the LMS where they exhibited some confusion on how to use the system. A Course 1 student noted how they were "*never told…how to use the* [Blackboard] *site*. *You just have to work it out yourself* (C1S3)". In Course 2, a student stated they found the LMS "*really confusing* (C2P5)". Nevertheless, in both these courses these students also commented on how these particular academics used their sites made it easier for them to navigate the system. These two courses were the ones that had highly structured sites with a strong teaching presence identified throughout the sites at multiple points. As discussed in the previous section, Course 3 students felt their site was a "*puzzle piece* (C3P5)" as they were only provided the University-approved course outline and three lab book documents within their course site. This confirms observations elsewhere (Zanjani, Edwards, Nykvist, & Geva, 2017) of student difficulties with using the LMS and highlights the need to structure and orientate the students to these environments.

Implications for practice

This study aimed to understand the student experience of technology-enhanced learning designs as a mechanism to improve academic design practices. The three themes drawn from the current student data were *sense of engagement, regulating learning* and *technical knowledge*. Drawing on the analysis of these themes three arguments will be presented that could have implications for ongoing practice for academics, academic developers and university administrators.

First, there is a crucial story to illuminate that focuses on the importance of designing coursework to support the best of student behaviours rather than the worst. Students rely on the use of technologies, such as the LMS and other digital resources, to facilitate their on-going engagement with the content and teaching team outside of structured activities (Henderson et al., 2017; Henderson et al., 2015; Russell, Malfroy, Gosper, & McKenzie, 2014). It is in this realm of supporting students review practices that academics can use technologies effectively to support improved learning outcomes. For example, while attendance to lectures may be important and if producing a perfect recording may not be a priority, academics should aim to put things in place to support these review activities in different ways. If academics do not provide these mechanisms students have been found to turn to web resources, such as YouTube, to supplement their learning (Henderson et al., 2015).

Secondly, there is a need to start fostering a common understanding with academics on the meaning of engagement to improve the experience of both participant groups in these learning environments. This

was evident in the use of Blackboard Collaborate where the findings highlight that the students do not seem to have the same feelings about the environment that academics do in relation to their engagement in the activity. In terms of the audio (academics) versus chat (students) reliance research reported by Brown, Schroeder, and Eaton (2016) has found that students do find it confusing to divide their attention between the discussions that are occurring on the audio and the chat. As such we can improve our professional development for these environments to support academics to design their Collaborate sessions to make full use of this schism.

Lastly, there may be a need for university administrations to reconsider their central support structures for students when it comes to the "digital campus". The findings in this study support those found by Selwyn (2016), that students are struggling to navigate our digital learning environments. There seems to be an over-reliance on the digital capabilities of our students even though research has found that there are more differences found within age groups than between when it comes to technical skills (Kennedy, Judd, Dalgarno, & Waycott, 2010). This over-reliance means that it seems to fall on individual academics (through their program and course designs) to embed these digital skills and inductions within course sites or learning designs (Russell, 2009; Russell et al., 2014). This can result in a fractured experience for students (Russell et al., 2014) who must then fend for themselves. It is important for administrators and central support structures to take note of this frustration of students and they should start planning more centralised student inductions into their universities' digital learning environments.

Future directions

The research project documented here has provided insight into how the use of student voice can be used to help bridge the divide between academic design practices and the student experience. As higher education institutions move towards more flexible and student-centred approaches to deliver quality learning and teaching it becomes increasingly important that both staff and student voices are heard. A fundamental shift in how these participants view the relationship between pedagogy and technology is needed (Garrison & Akyol, 2009; Garrison & Kanuka, 2004; Kirkup & Kirkwood, 2005; Livingstone, 2012). However, more research is required to understand how these participants understand and interact and inform each other in these technology-enhanced learning environments.

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