What works and why? Student perceptions of 'useful' digital technology in university teaching and learning

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Michael Henderson, Neil Selwyn & Rachel Aston (2017)
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INTRODUCTION

Differences have long persisted between the well-proven *potential* of technology-enabled learning, and the less consistent *realities* of technology use within university teaching and learning. On the one hand, the potential of digital technologies to enhance student learning has been well established. Benefits include the enhanced diversity of provision and equity of access to higher education, alongside the increased efficiency of delivery and personalization of learning processes (see Luckin *et al*. 2012, Goodfellow & Lea 2013). Much enthusiasm has also surrounded the development of digital technologies along increasingly personalized, remote, adaptive and data-driven lines (Johnson *et al*. 2012). Digital technologies of this nature are clearly integral to the future of university education around the world.

The imperative for technologically-driven forms of higher education is seen to be exacerbated by the changing backgrounds and dispositions of the people now entering universities as undergraduate students. While the crude essentialising notion of the 'digital native' who was 'born digital' has been rightly criticized, the belief remains amongst many commentators that incoming cohorts of university students are more digitally-adept and digitally-attuned than previously was the case. As such, these are assumed to be students who are more expectant of being able to use digital technologies throughout all aspects of their university studies. Recent literature has talked, for example, of many university students as being 'digital residents' – i.e. accustomed to experiencing digital technologies as seamless, 'always-on' and highly participatory social spaces (Wright *et al*. 2014). For these students, digital environments such as the internet are a way of life rather than discrete functional tools that can be turned on and turned off.

Amidst these shifts, however, it is important to recognize the difficulties that universities *and* students face in making 'good' use of digital technologies. The use of digital technologies for learning and teaching has long been inconsistent – varying considerably between subject disciplines, levels of study, modes of delivery and institutions (Selwyn 2014). The take-up of online learning opportunities by students

varies considerably according to age, stage, subject area and institution (Jones *et al*. 2012, Kennedy *et al*. 2010). More attention therefore needs to be paid towards the reasons why students engage with specific forms of digital technologies during their studies. This raises questions about the roles that these technologies are playing in student learning, the meanings that are being attached to different digital practices, and the outcomes and consequences of any use.

With these issues in mind, the present paper aims to develop a realistic sense of how digital technologies now form part of the contemporary student experience. As such, the paper addresses the following set of research questions:

- What forms of digital technology use do undergraduate students report as being notably helpful or beneficial in terms of their university studies?
- What are the characteristics and contexts of students' beneficial technology use?
- What meanings and wider connotations related to university study and the student experience are associated with these perceived benefits?

RESEARCH METHODS

These questions are addressed through an analysis of survey data collected as part of a larger study of digital technology use in universities. Data were collected during the 2014 academic year from students of two similarly sized and proportioned universities in Australia:

- University A - a public research-based university in the Southeast of Australia. The university has five campuses with a current total enrolment of approximately 46,000 undergraduates, mostly taking on-campus courses. The university offers undergraduate and postgraduate degrees across ten main subject areas (in order of magnitude): Business and Economics (11,500 undergraduate students); Medicine, Nursing and Health Sciences (7500); Arts/Social Sciences (7400); Engineering (4250); Education (4000); Science (4000); Law (2500); Information Technology (2000); Pharmacy and Pharmaceutical Sciences (1400); Art, Design and Architecture (1250).

- University B - a public research-based university in the North-East of Australia. The university has five campuses with a current total enrolment of approximately 31,500 undergraduates, mostly taking on-campus courses. The university offers undergraduate and postgraduate degrees across four subject areas (in order of magnitude): Business and associated subjects (10,000 undergraduate students); Arts, Education and Law (9000); Health and associated subjects (7500); Science, Environment, Engineering and Technology (5000).

All undergraduate students in both institutions were invited to complete an online questionnaire containing items investigating their engagement with digital technologies. The survey was promoted to students through email, faculty communications, on-campus print and online advertising. The self-selecting sample of those students who chose to respond consisted of 1658 students with an age range of

17 to 66 (mean age=22.5, SD=6.9). As can be seen in Table One, the sample was balanced in terms of respondents' mode of study (e.g. full-time/part-time), academic performance and domicile (e.g. on-campus/off-campus). However, there was a slight over-representation of students in their first year of study and those taking science subjects. Moreover, the self-selecting nature of the sampling resulted in larger proportions of female students and those from University A. That said, the analysis of data showed no notable patterning between responses from male/female respondents or between respondents from University A/University B, suggesting that the survey data were not unduly imbalanced by these sampling biases.

The present paper examines data arising from questionnaire items that asked respondents to nominate and justify the digital technologies that they found to be 'particularly helpful' and/or 'useful' during their university studies. A two part open-ended question was asked: '*What has been the most useful examples of technology-based learning that you've experienced so far in your university course?*' followed by '*Please explain why these were particularly helpful/useful*'. This resulted in 4594 different examples being provided – forming a corpus of data totalling 103,299 words. Analysis of these data took the form of relatively straightforward thematic analysis. This involved initial readings of all responses to the open-ended survey items to gain an overall sense of the data. These data were then read again and 'open-coded' to produce an initial code list until, in the opinion of the research team, analysis had reached theoretical saturation. Although some codes were adapted which directly used the language of the respondents the majority were researcher-led and analytic. From this basis the data were then selectively coded in terms of categories identified with the initial code list directly related to the aims of the study.

	n	per cent
Gender		
Female	945	66.6
Male	473	33.4
University		
University A (SE Australia)	1250	75.4
University B (NE Australia)	408	24.6
Year of study		
First	627	37.9
Second	395	23.9
Third	347	21.0
Fourth (and above)	287	17.3
Subject area		
Medicine (and allied subjects)	366	22.1
Sciences (physical and biological)	245	14.8
Engineering, computer science & maths	181	10.9
Business	275	16.6
Social sciences, economics and politics	132	8.0
Law	122	7.4
Humanities, languages and library studies	113	6.8
Creative arts and design	60	3.6
Education	162	9.8
Mode of study		
Full-time study	1321	92.9
Part-time study	101	7.1
Age group		
Mature aged (i.e. aged 21 years or more at entry)	288	20.5
Younger (i.e. aged 20 years or less at entry)	1119	79.5
Academic performance		

High distinction	236	17.1
Distinction	643	46.6
Credit	410	29.7
Pass (or lower)	91	6.6
Domicile status		
Domestic students	1258	88.8
International students	159	11.2

Table one. Survey respondents by individual characteristics (n=1658). NB. some totals do not add up to 1658 due to differing completion rates for each item.

RESULTS

The survey asked respondents to nominate and justify the digital technologies that they found to be 'most useful' during their university studies. From the 4594 nominated examples, eleven distinct digital practices were identified and coded. These data give valuable insights into what students were using digital technologies for, and what meanings were being attached to these practices. As can be seen in table two, the most prominent practices related to the logistics of university study – i.e. organizing schedules and fulfilling course requirements; being able to engage with university studies on a 'remote' and/or mobile basis; and the broad issue of managing time and time-saving. Tellingly, practices explicitly related to learning were reported less frequently. One of the most prominent learning-related practice was 'reviewing, replaying and revising' digitally recorded learning materials – most notably the viewing and listening of lecture recordings. Using digital technologies to 'research information' was also a prominently reported practice. While less frequently reported, the capacity of digital technologies to allow students to engage with information in more 'visual' forms was also a recurring theme, as was the practice of 'looking elsewhere' for supplementary materials to corroborate or clarify what had been learnt at university.

Practice	Description	Digital devices/ practices most cited in relation to this factor	per cent citing
Organizing & managing the logistics of studying	Managing schedules, timetables, fulfilling deadlines and course requirements, 'keeping in the loop' re. university and course information and news.	Learning management system as repository of resources & information.	46.9
Flexibility of place & location	Flexibility of location, ability to engage 'remotely' with academic work off-campus, engaging at a distance and not having to be 'present', being able to be mobile, portability of university work	Library databases and library websites; Laptop computers.	32.7
Time-saving	Saving student time, quicker processes, more immediate outcomes, convenient scheduling of activities.	Writing notes/ word-processing; Library databases and library websites; Online assignment submission.	30.6
Reviewing, replaying & revising	Catching up on missed material, repeating viewing of materials to improve understanding	Lecture recordings (audio/video) of university lectures.	27.9
Researching information	Researching information for assignments; quantity and quality of information access	Library databases and library websites;	27.9
Supporting basic tasks	'Easier' writing of assignments; 'easier' and 'helpful' information management and retrieval of resources	Writing notes/ word-processing; General internet search engines (e.g. Google).	26.4

Communicating & collaborating	Asking questions and exchanging information; working with other students; sharing ideas; preparing group work.	Facebook and other social networks; Google docs, wikis, collaborative documents.	16.8
Augmenting university learning materials	Watching lectures, tutorials and talks from outside university; cross-checking and comparing with other sources; 'going elsewhere'.	Watching videos from sources outside university; Wikipedia	14.6
Seeing information in different ways	Visualizing concepts through video, animation or annotations; allowing real-time lecturer demonstrations and 'board work' in lectures;	Watching videos from sources outside university.	11.7
Cost saving	Saving money and expenditure	E-readers, online journals and books	4.4
Gauging a sense of progress	Identifying gaps in understanding and knowledge; seeing what other students think; being tested; receiving feedback	Clickers, live polls in lectures; Quizzes.	4.2

Table Two. Cited reasons for digital technology being particularly useful in relation to students' university studies

These themes can now be explored in more detail. The most frequently raised set of benefits centred on the role of digital technology in **organising and managing the logistics of studying** (46.9 per cent of respondents). This was described in broad terms of "keeping on track" (respondent#735) and "keep[ing] up to date" (6). Often these benefits related to assessment deadlines and other course requirements. Students described their universities' digital systems as keeping them 'organized' (1241), 'regulate[d]' (493), 'manage[d]' (138) and 'focalized' (479). For example:

> "Having this information at my fingertips allowed me to get organised for the whole semester. It allowed me to see all the work ahead including a week to week view of the unit's learning objectives, assessments that were set for the unit, accessing upload lecture notes and posted articles relating to the lecture and most importantly accessing grades for my assessment tasks!" (1241)

In this sense, digital platforms such as the Learning Management System were valued as the 'one place' (159, 335, 705, 1270, 1497, 1880) to interact successfully with university requirements:

> "As we are all really busy Moodle is great as all the information we need for a unit is stored in one place and the faculty are super fast and responding to questions on there or on email which means we received the information we need without interrupting them all the time or waiting for call backs" (139)

For some students, then, the "priceless" (653) role that digital technology played in their studies was "provid[ing] structure and guidelines" (306) and not "hav[ing[to rely on as much organization by myself" (335):

> "I use it almost everyday. It organizes my university life and allays my concerns of when and where I have to be" (719)

Another frequently cited benefit centred on **flexibilities of place and location** (32.7 per cent of responding students). On one hand, various accounts were given of

students' use of digital devices to work 'on the go' (1606). This took place while 'commuting' (1646) from other suburbs and towns, "study[ing] across several campuses" (180) and, in some cases, working 'interstate and internationally' (190). A clear sense emerged of a mobile student population for whom devices such as laptops and tablets were allowing university work to be engaged with "anywhere I want" (1508):

> "I can study anywhere be it on a train or plane. There are no geographic boundaries" (385)

Often the specific benefits of this flexibility and mobility were notably prosaic. Much mention was made of the 'lightweight' (63) nature of digital devices in comparison to "lugging heavy books around" (1664). For some respondents, then, digital technology was beneficial simply in terms of reduced physical exertion, i.e.: "mak[ing] my bag less heavier" (788). For others, flexibility of location allowed for students to be *less* mobile, notably in avoiding the "pain" (682) and "hassle of trekking into university" (584). As one student proclaimed, through online access to his studies "I am not bound to come into campus" (675).

A third valued digital practice highlighted by 30.6 per cent of respondents was '**saving time**' (663). The ease with which students could "multitask" (158, 719) was reported repeatedly, often in terms of fitting university work with "other essential roles which can conflict with learning" (874). As one mature student reflected: "I have three kids now and am busy - time is precious!" (316). Alternately, as a younger respondent enthused: "I can sleep in an extra 15 minutes" (235). Often these time-related benefits were described as making university work "far more faster" (61), "much quicker" (1473), "more streamlined" (316) and "expediting work [and] saving countless hours" (1836). Conversely, mention was also made of digital technologies being used to alter the pace of studying ("means that I can pause and catch up" (616)), as well as making better use of 'down time' - "allow[s] me to make good use of my time between classes" (617). The "instantaneous" (394) and "immediate" (1877) online access to information and communication was another time-related benefit, as was the ability to "work right up to the deadline" (208) and at the "last minute" (5029).

Another commonly cited benefit related to the **reviewing, replaying and revising** of digital learning materials (27.9 per cent). This related primarily to video and audio recordings of university lectures and other classes. Often these benefits related specifically to viewing content for the first time having missed the 'live' class. Digital technology therefore mitigated "unavoidable unattendance" (578) due to illness, "juggl[ing] a full timetable" (582) or simply because "I'm not a morning person. Having online lectures helps me with time management because I can fit the lecture when I can" (829). Digital technology was therefore an appreciated "compromise" (433) for "mak[ing] up a class" (19) and generally "catching up" (1706).

These benefits were also reported by students who *had* attended the original live classes but wanted to "re-access" (752), "re-listen" (1906) and "consolidate and clarify what I was taught" (588). This revising was valued particularly in terms of "lectures I did not understand" (75) and also "to review [material] closer to an assessment task" (152):

> "Sometimes when you attend a pre or post lab talk you can't write it all down or absorb it all. This way you can write up all the information and keep looking over it. As over and over = certainty" (757)

As this evocation of 'over and over' implies, digital video and audio recordings were welcomed for allowing repeated and focused engagement with teaching content – what one student described as "infinite replay value, speed up, slow down" (187). Digital learning content could be "broken up into digestible segments" (761), "at a pace constructive to my learning" (237) with the ability for "re-listening, skipping and getting to relevant points" (1372). Tellingly, the possible use of this technology was valued by some students more than any actual engagement. Thus while the online cache of lecture content was felt to be "reassuring" (232) and offering a potential "backup of the everyday learning activities at Uni" (573), it was not necessary utilized:

> "'Video Lecture' enables me to access online lectures if I am unable to attend lectures on campus. To be completely honest I have only attended one lecture on campus and very rarely use 'Video Lecture' but it is definitely the most USEFUL service" (523)

An equally cited benefit related to the use of digital technology for **researching information** (27.9 per cent). This primarily involved the use of online library databases and e-journals. As one student recounted:

> "I have never once found a physical journal in a [University A] library in six years, and I don't intend to. The wide availability of journals online (and again, from home) makes finding and reading the relevant literature easy" (628).

Online library resources were described as providing a number of advantages, not least avoiding the time and effort of "having to sift through the library" (474) or "trawling through books" (1654). As one respondent reasoned: "to search just the library for information would be too much and probably wastes a lot of time flipping through" (935). While some students took a relatively crude approach to their online research ("rather than searching thousands of books, I just type into Google" [421]), others benefited from "intelligently filtered" (385) information that "can give you an academic edge" (385). This academic advantage was often associated with the retrieval of "quality information that are accepted references" (543). Some students described this practice in emotive terms ("a powerful pedagogical tool" [380]), while others were more pragmatic: "need to get dem references!" (734).

A mundane set of digital practices that were nonetheless highlighted by 26.4 per cent of respondents was the role played by digital technologies in **supporting basic tasks**. A surprising number of respondents considered the most useful aspect of digital technology to be supporting note taking and "editing and redrafting" (287) of assignments. As one student put it, "well, I can't write my notes or assignments without Microsoft Word" (253). More specifically, some respondents highlighted "help with spelling and grammar which is often worth a few marks in essays" (140),

as well as the reassurance of "the computer automatically corrects the errors" (356). Also prevalent was mention of computer-assisted "citation management" (552):

> **"**It has helped me organize my references and reading notes. It's also super easy to insert references when I am writing so that I can stay focused on the message that I am writing and just quickly draw in the reference that I can think of at that particular point in time" (405)

Tellingly, this computer-assisted support was described by a few students as particularly useful in less attentive moments – i.e. "especially when I am in default mode" (393).

Other obvious benefits were the use of digital technologies for **communicating and collaborating** with fellow students (16.8 per cent). This was particularly associated with formal mandated group work, with technologies such as Facebook and Google Docs reckoned to "make working in a group a lot easier" (167) and "extremely useful in coordinating a virtual team" (649). As one respondent concurred, these technologies "make it possible for group assignments to actually be useful learning and not just an exercise in coordinating the group" (915). These benefits were also cited in terms of *ad hoc* group activities and communal support:

> "[Facebook] is a casual forum where I can bounce ideas off friends, particularly those interested in similar areas as me, and I don't feel like I'm asking questions that are obvious or stupid like I do on Moodle" (189)

Also cited was the role that technology played in **augmenting university learning materials** (14.6 per cent). This related particularly to videos hosted on social media platforms such as You Tube ("allowed me to view content in a dynamic way" [183]), and information posted on Twitter ("allows me to glean important news" [115]). Most often these sources were described as offering students help when having "difficulty with a specific topic" (888) or "struggl[ing] to understand something being taught at uni" (654):

> 'Often when studying a new concept, I'll struggle to understand it fully simply using the resources that are provided by the lecturer or in tutorial classes. With YouTube, I can easily search key terms and a whole host of videos will be supplied to me with different examples" (468)

> "I think usually uni readings are overcomplicated and do not explain things very straightforwardly. Wikipedia explain concepts clearly so that I am more able to understand the uni readings" (217)

Less frequently cited was the learning-related benefit of using technology to **see information in different ways** (11.7 per cent). Often these responses described technology being used by lecturers to demonstrate and/or illustrate concepts or ideas. Engineering students, for example, valued their lecturers' use of drawing software to "explain mechanisms and draw them in real time" (732). Similarly, as this Business student argued:

> "we can watch the lecturer demonstrate how the key theories and data is transferred and developed into models in the class. Rather than them saying 'this line here, and then that line there', they can draw and change models to show different outcomes and examples" (284)

Some students described these uses as leading to 'deeper' learning. The use of videos, for example, was seen to "allow lecturers to really illustrate a point and get students to connect on a deeper level with the subject material rather than just theoretically" (457). Elsewhere, however, these forms of digital pedagogy were simply described as diverting, "mak[ing] the learning more fun" (176) and "break[ing] up the lecture" (343). As one student reasoned: "I drift off if someone is just talking. I need stimulation" (826). Many respondents justified their appreciation of these forms of digital pedagogy with being "a very visual person" (935) and "very much a visual learner" (382). Thus the use of videos, annotation and drawing applications in lectures was welcomed as " seeing relevant images, dot points and diagrams on the screen aids me in absorbing the information" (1520).

From a practical point of view, 4.4 per cent of respondents raised the benefit of technology-related **cost saving**. A recurring theme here was the reading of documents online rather than having to print-off paper copies – "it has saved me a ton of money" (197). Finally, 4.2 per cent of respondents cited technologies such as online quizzes and in-class polling as allowing students to **gauge a sense of progress**. These technologies were described as allowing for "instant feedback" (1367), "immediate feedback" (499) and "much faster feedback" (254) than was otherwise possible. As one respondent concluded: "getting a better idea of what classmates think tells me if we're thinking similarly" (658).

DISCUSSION

This study fits a wider recent trend for higher education research to pay particular attention to "what students do as they live their lives" (Stokoe *et al*. 2013, p.76). As such, the data presented in this paper point to clear gaps between university students' actual uses of digital technology and the more abstracted rhetoric of 'technology-enhanced-learning' and suchlike. Thus our findings reaffirm the need to "be cognizant of students' lived reality, not just institutional and/or systemic interests" (Mackaskill & Denovan 2013, p.747). As such, while our investigation set out ostensibly to focus on 'best practice' and 'most useful' aspects of technology use, the resulting survey data are perhaps more insightful in shedding light on the notably bounded nature of university students' engagements with digital technology.

In particular, many of the reportedly 'educational' benefits of digital technology reported in this paper are more accurately described as concerned with the 'logistics' of university study rather than matters related directly to 'learning' *per se*. Many of these responses related to uses of digital technology to locate and retrieve journal articles and books, to submit assignments, to work out course requirements and scheduling issues, to consume lecture content and so on. These activities are clearly

crucial elements of undergraduate study, but give little sense of the learning/learner related issues that often drive enthusiasms for the educational potential of digital technologies. Instead, much of what students were reporting as 'most useful' about digital technologies related to what Denovan and Macaskill (2013) term 'academic focus' – i.e. completing prescribed academic work and dutifully 'performing well'. In this sense, digital technologies were most likely to be portrayed as supporting students' organization of academic work and general ability to "manage academic demands". Much of how respondents framed their satisfaction with digital technology therefore mirrors findings from research into students' general perceptions of what makes for a 'good' university environment – i.e. issues of functionality, responsiveness and an ease of being able to find one's way around the demands of the university environment (Douglas *et al*. 2014).

Indeed, when concerns with 'learning' *were* apparent in our survey data then these tended to be described primarily in what could be termed 'surface' and/or 'strategic' terms. As such, respondents most often framed learning as externally imposed and involving the routine acquisition and/or reproduction of transmitted knowledge, i.e. what Virtanen & Lindblom-Ylänne (2010) characterize as the "right knowledge … right answers and right facts". Thus, for many respondents, technology-supported 'learning' appears to be centred on the completion of set learning tasks in an expedient and/or efficient manner (Entwistle and Ramsden 1983). The digital practices that were most often cited as 'useful', therefore, related to issues of "clarity, organization, planning, flexibility" in achieving one's 'learning' goals and providing "help to find the facts" (Virtanen & Lindblom-Ylänne 2010).

This 'strategic' approach towards digital technology was apparent even in the two themes emerging from our data that appeared to most directly reflect a technological 'enhancement' of learning – i.e. what was termed as 'reviewing, replaying & revising' and 'seeing information in different ways'. These themes certainly are more nuanced than the 'outcome' led practices of writing and drafting assignments, keeping 'in the loop' and saving time. Yet the extent to which the use of digital technology to visualize teaching content could be said to constitute 'good' learning is questionable. In contrast, Psaltou-Joycey and Kantaridou (2011) describe the common preference for 'visual' modes of learning as a relatively unsophisticated 'comfort zone' for many university students. Similarly, the use of digital technologies for the 'structured reviewing' of teaching materials also could be said to be a 'closure orientated' study practice rather than a more open-ended approach to engaging with knowledge (Psaltou-Joycey and Kantaridou 2011). Watching and re-watching video lectures, and preferring to look at diagrams, animations and images as opposed to engaging with the written or spoken word are perhaps not particularly advanced forms of digitally-enhanced learning. These are, however, what many students appear to find particularly useful and supportive.

Clearly, then digital technology is helping undergraduate students in a number of ways. Yet, often these tend *not* to be the creative, collaborative, participatory and hyper-connected practices that tend to be foregrounded in discussions of digital education and learning technology. Rather these are the activities, practices and processes that students feel compelled to undertake in order to 'do' university. Thus the 'best' uses of digital technology highlighted in these data could be said to offer a telling reflection of the realities of contemporary student life. Indeed, much of our

data could be seen simply as relating to students using technology to work through (and work around) what Lairio *et al*. (2013, p.123) term 'the strain of study' – i.e. the "confused, restrictive, hurried, stressing, quite grey, monotonous" aspects of academic endeavour. Issues of time, organization of deadlines, and the juggling of competing priorities all featured prominently in the perceived benefits of digital technology highlighted in our study. In this sense, much of what is being valued about digital technology relates to the on-going 'effort' involved in being a student – i.e. the on-going demands of revision, examinations, coursework; the continual travel between classes/buildings; and the loss of home comfort and having to fend for oneself (Woodall *et al*. 2014). Many of these strains are related to the demands of the 'autonomous', 'independent' and 'self-directed' modes of working that students are expected to assume in many higher education programs of study. Digital technologies would therefore seem to be a valued means of relieving some of the strains.

As such, students' uses of digital technologies (and perceptions of 'what works' best) are clearly being shaped by the university contexts within which students are situated as much as they are being driven by individual 'choice' and agency, or even by some supposed 'affordance' of the digital technology. Indeed, it has long been argued that student experiences are shaped profoundly by the nature of the educational institutions and the educational contexts that they find themselves in. As Harry Daniels (2012, p.2) contends, "the cultures of institutions and the patterns of social interaction within them exert a formative effect on the 'what' and 'how' of learning". Thus it is perhaps not surprising that the ways that undergraduate curricula are structured, the ways that content is created, delivered and received, the ways that assessments and evaluations are designed, all go to frame what 'digital technology' is for many university students. Indeed, the formal transmission of 'educational knowledge' continues to characterize most aspects of university education – e.g. regulating the structure of student experiences, the ways in which their identities as 'learners' are formed, and the relations that are formed with other students and teaching staff (Gale and Parker 2014). There is little reason to expect digital technology somehow to be different.

Put bluntly, then, the rather limited sets of digital practices highlighted in our data, are those that best 'fit' the rather limited expectations and processes that currently constitute university teaching and learning. For example, if the assessment and accountability of many undergraduate students is being framed primarily in terms of the ability to 'research' and produce sole-authored assignments, then these students will understandably approach their use of digital technologies along such 'outcome-led' lines (Flores *et al.* 2014). As Wright *et al*. (2014, p.138) conclude, "it is not surprising" that students display depowered "learned behaviours" when using digital technologies in academic contexts. In this sense, the lack of more active, participatory or creative uses of technology within our survey data suggests that only certain forms of digital practice are being legitimized through wider institutional regimes and systems of configuration. As we have discussed, these appear to be the digital practices, applications and artefacts that 'best' allow students to "make sense of institutional work, while, at the same time, establishing and maintaining institutionally embedded routines" (Palmer *et al*. 2013, p.488).

CONCLUSIONS

Our study clearly finds digital technologies to be a central element of undergraduate education, and associated with substantial changes to the ways in which students experience their studies. However, our analysis also suggests that digital technologies are clearly not 'transforming' the nature of university teaching and learning, or even substantially disrupting the 'student experience'. This then raises the overarching question of what – if anything – needs to be 'done'. University students are certainly finding and making good uses of digital technologies that 'work best' for them within the context of their undergraduate studies. However, these uses and practices are not the most expansive, expressive, empowering, enlightening or even exciting ways that digital technologies *could* be used.

On the one hand, then, it is reasonable to conclude that universities have an obligation to continue to support these useful 'logistical' and 'study-focused' aspects of students' digital studies. Thus universities would be well-advised to continue to develop their repositories of digital resources, improve the reliability and 'user-friendliness' of learning management systems, and extend the availability and accessibility of other core systems. On the other hand, however, there is also a need to think more carefully about how broader institutional practices and expectations are shaping the 'what' and the 'how' of digital technology in higher education. In particular, more attention might be paid towards how institutional cultures and assumptions of curriculum, assessment, accreditation and so on 'mesh' with other (often external) expectations for technology-supported learning. If higher educators wish to see students move beyond the largely 'safe', bounded and outcome-focused uses of digital technology reported in this paper, then alternate contexts of teaching and learning need to be legitimized where alternate (perhaps more active, more participatory or more creative) uses of digital technology will be of genuine 'use' and 'help'.

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