An investigation of pre-service teachers' attitude and learning through a learning management system

Darren Pullen
University of Tasmania

Abstract

Australian universities are increasingly turning to the use of information and communications technology (ICT) in particular learning management systems (LMS) to assist in the teaching and delivery of course materials and to provide assessment. New and improved information technologies such as the learning management system Desire2Learn provide a mechanism for universities to deliver courses to more diverse students, such as students who cannot attend campus based study for various reasons, such as work or family commitments or due to cost or physical distance. Recognising these facets, many universities have incorporated the use of learning management systems, also called content management systems (CMS), as an integral component of their teaching delivery platforms. This study-investigated student attitudes and learning through a LMS and compared the differences between two groups of students (N = 203) studying the same course in two different learning modes-fully online or on-campus. Study results revealed that the students study mode (online or on-campus) did not affect their end of unit results (mark or grade). What affected unit results were factors, which could be considered motivational such as tutorial attendance and listening to pre-recorded lectures more than once?

Keywords

educational technology; e-learning; learning management systems; online teaching; social media; university education

Introduction

The use of information and communications technology (ICT), which includes computers and computer-based learning platforms such as PLATO (Parker & Davey, 2014), have been used to support teaching and student learning since the 1950's. The advent of the Internet in the 1990's has enabled not only more use of technology it has opened up access to learning to many who may not have had the opportunity before due to cost or distance (Oliver, 2006). In the tertiary education sector it could be said that universities have "blindly" taken on faith that higher education can be fixed by technology (Robins & Webster, 1989) in that many, if not most, universities have spent

a considerable amount of time and money on providing some form of learning management system (LMS). More recent times has seen the use of technology to support teaching and student learning move from a mechanism for the provision of distance education to a means of also providing education and support for on-campus students. At the same time technology has been espoused as a panacea to supporting teaching, universities' have been dealing with changes in student demographics, funding and more recently in Australia the prospect of a deregulated tertiary sector. In order to understand how students are using technology a brief understanding of why universities have adopted their particular technology stance is required.

Within an Australian context universities are under increasing pressure to cater for more diverse student learning needs and regional universities such as UTAS are catering for an increasingly decentralised student population (Jankowska & Atlay, 2008) who are a considerable distance away from the physical campus. In 2012 Australian universities underwent a dramatic change in how undergraduate student allocations were determined. From 2012 Australian universities have been able to enrol as many students as they wished-based upon their own determination of student eligibility and institutional capacity to teach them (King & James, 2013). Coupled with this 'uncapping' of undergraduate places the Federal Government has adopted the Bradley Review Reforms (Bradley, 2008) which have broad ranging goals around increasing national targets of 40 per cent of 25-34 year olds holding a bachelor's degree by 2025 (up from a 2008 base of around 29 per cent); further 20 per cent of undergraduate tertiary places will be for students from lower social-economic-status by 2020 (up from around 15 per cent). The Bradley reforms (Bradley, Noonan, Nugent & Scales, 2008) promote access to higher education for all regardless of capacity to pay thus increasing student numbers, it will also fundamentally change the student mix requiring broader institutional and course strategies to retain and engage students. More recently the Federal Government has proposed reform measures to deregulate the tertiary sector (Pyne, 2014). In addition, funding policy changes associated with a rapidly changing technological landscape are a game changer for Australian universities. How academics and students (i.e. learners) embrace these changes is still evolving. However, how academics use technology to foster student engagement and learning will be critical in determining student and institutional success.

Online course provision, often called distance education, is just one of the many and varied initiatives that universities such as the University of Tasmania (UTAS) has adopted to cater for a greater diversification of students and new funding arrangements. UTAS currently caters for more than 29,000 students across three Tasmanian-based campuses in addition to several mainland and overseas campuses. UTAS also offers a virtual online campus though its use of the commercial e-learning platform *Desire2Learn* (UTAS, 2013). This LMS is currently being used in over 69 per cent of UTAS units (modules) (Colbeck, 2014). In addition to offering a LMS presence for assessed units UTAS provides a free Massive Open Online Course (MOOC) in *Understanding Dementia* (UTAS, 2014b). From a personal perspective when I started at UTAS in 2005 I taught less than 100 students in the unit which will be described later in this paper and they could only undertake study on-campus. Move forward a decade and now the same unit has over 250 students and approximately 80 per cent study the unit on-line (referred to as distance education).

Teaching staff at UTAS use the LMS platform to facilitate knowledge, foster collaborative learning and customise the learning tool/platform to suit student needs. The customisation however is limited to offering discussion boards and hyperlinks to videos such as pre-recorded lectures. Teaching staff can make *Desire2Learn* available to their students, regardless of their study mode (distance, on-campus or blended [some combination of on-campus and online]) and use a range of resources and tools (such as chat rooms, bulletin boards and embedded videos) within the LMS to promote student learning. The decision of what to offer to on-campus students is an individual teaching preference, though the University has mandated that all units should have an online presence, which could be as simple as the unit outline being made available in a pdf document.

The LMS is an important resource that students use to: access knowledge, collaborate, learn, and acquire skills in addition to engaging with fellow students and teaching staff. Likewise, teaching staff can use the LMS to communicate teaching content and learning activities together with course announcements with all of their students, regardless of study mode. Building a clearer picture of what students are doing whilst studying online, and discovering how they might get more from their studies requires information on students' involvement with the LMS and other forms of technology, such as social media which they might be using to augment their study. Triangulating this information with other data available on students such as demographics, information on teaching practices and curriculum, student satisfaction findings, measures of graduate outcomes and data on student attrition, retention, progress and completion will help unit developers (teaching staff). Furthermore, understanding how students' engage with learning and ways in which this engagement and learning could be enhanced will assist future unit and course delivery.

Online teaching and learning
Within the tertiary education sector one of the heated debates is whether to offer all, part or none of the course online (Kinash & McClean, 2013). In determining the success of studying online versus on-campus a range of studies have been conducted that have looked at students' use of technology for learning. A contemporary Australian study of 2120 undergraduate students found that despite the undergraduate students being considered as digital natives their use of the available university technologies was not consistent and not all of the available technologies were being used to the full potential (Kennedy, Churchward, Gray & Krause, 2008). In other studies such as those by De Boer and Collis, (2005) and Normand, Littlejohn and Falconer (2008) demonstrated that helping instructors (course developers and teachers) who are able to identify teaching and learning tools that students access for study is feasible and practical and can assist staff improve student learning outcomes. The time and effort students devote to learning using technology with regard to what forms of technology are selected and students' subsequent use of technological tools directly and indirectly affects how and what students' learn and what technology they use to learn with. Whilst the literature abounds with examples of technology being used daily by students it still remains unclear exactly what technology is used, for what purpose and for how long (Schroeder, Minocha & Schneider, 2010). Several contemporary studies into learners access to learning online or through technology (e-learning) in educational settings have shown an increasing divide between levels of access, types of technology resources but equally the abilities of the users to be able to fully access the available functions or capabilities

of the technology for a learning related purpose (Cooper, 2006; JF, Pullen & Swabey, 2014; Pilkington, 2008; Thompson, 2013).

The increasing use of the Internet for learning particularly since the late 1990's has resulted in a greater potential to access information *anywhere anytime*, and appears to have replaced the more traditional correspondence course via postal mail service. In Australia 83 per cent of the population aged 15 years and older were classified as using the Internet (ABS, 2013). The Australian Bureau of Statistics *Household Use of*

Information Technology 2012-2013 survey found that 97 per cent of Internet users accessed the Internet from home versus 49 per cent at their place of work. Using the Internet for social networking accounted for 66 per cent of users whilst educational activities accounted for 65 per cent, for those aged between 18 and 24. In those aged 25 to 34 Internet use for educational purposes was 50 per cent and for those aged 35 to 44 just over 40 per cent (ABS, 2013). This ABS data shows that the Internet is increasingly becoming a common delivery medium for education and study (Burbules & Callister, 2000; Walker, Huddlestone & Pullen, 2010; Roblyer, McDaniel, Webb, Herman & Witty, 2010). Teachers, who are teaching online, for varying reasons ranging from pedagogical through to institutional demands, are being challenged to rethink their underlying assumptions about what and how they teach and how students learn (Wiesenberg & Stacey, 2008) not only in face-to-face or on-campus delivery methods but increasingly for online and blended study.

An effective higher educational setting is characterised by the quality of its teaching and level of student engagement and success (Boud & Prossser, 2002). With changing work practices and a changing student profile many universities and students are opting to study online due to its convenience for them as learners. In line with these industry changes is realignment between academic teaching practices and student approaches to learning (Biggs, 2003, Ramsden, 2003). Furthermore, governments worldwide are using funding policies to 'help' universities to shift their teaching paradigms from doing what the teacher requires to a more learner centered approach within which "learning has been explicitly identified as the main catalyst for economic competitiveness and growth" (Cullen, Hadjivassiliou, Hamilton, Kelleher, Sommerlad & Stern, 2002, p. 12) which hopefully will result in improved student learning outcomes (Australian Learning and Teaching Council, 2013).

Evolving technologies (e.g., such as LMS and web-based communication systems such as Skype) over the last decade afford many and varied teaching and learning opportunities ranging from flexibility of design (De Boer & Collis, 2005; Normand, Littlejohn & Falconer, 2008) through to a sense of being able to study anywhere anytime (Willems, 2005). In reporting back the findings from flexible delivery within the research literature many studies report on how the flexibility was implemented into the course design (Lindberg & Olofsson, 2006; Willems, 2005). This paper takes the view that despite how course designers tailor their material for flexible delivery, it is the students themselves who will ultimately decide *if* and *how* they will use the technologies that are made available to them by the teaching staff in their unit and ones the students' use anyway (such as social media).

Learning on campus versus learning online

The debate around providing learning material on-campus or online may be misplaced. Perhaps the debate should be around what learning is taking place in both mediums and how that learning may be enhanced. To highlight this point the Pew Research Center found that of 1,055 American University and College Presidents surveyed in 2011 only half (51%) thought online study was comparable in terms of learning to on-campus study. Despite this low figure 77% of those University and College Presidents reported that their institution was offering some degree of their courses online (Parker, Lenhart & Moore, 2011). The Pew Research Center findings indicate that the belief that learning online is comparable to on-campus study is low, but despite this the tertiary educating sector is continuing to commit to developing online learning courses. In one study (Bowen, Chingos, Lack & Nygren, 2013) findings indicate that learning online offered no greater educational gains to on-campus study. Yet in another study it has been suggested online programs promote student-centered learning, encourage wider student participation, and produce more in-depth and reasoned discussions than traditional face-to-face programs (Smith & Hardaker, 2000; Teo, van Schalik, 2012a). Other studies have reported that online study supports student collaboration (Kuo, Walker, Belland & Schroder, 2013; So & Brush, 2008).

Given that previous studies have found little difference in learning between on-campus and online student achievement (Bowen, Chingos, Lack & Nygren, 2013) and online students use collaborative learning methods to learn (Kuo, Walker, Belland & Schroder, 2013) the current study sought to understand how students were using the learning tools available in the *Desire2Learn* learning management system. Anecdotally it was felt by the author that LMS features were not being fully utilized-and if students (on-campus and online) used other technologies to augment the available courses LMS teaching staff might be able to capatalise on this once those alternative non-university 'regulated/controlled' technologies were identified.

Purpose of the study

The purpose of this research study was to identify the differences in educational attainment (learning) between third year (of a four year degree) pre-service teachers studying a compulsory undergraduate module either fully online (sometimes referred to as distance or e-learning) or on-campus (sometimes referred to as face-to-face). In examining this difference the research sought answers to:

Research question 1 (RQ1) *Does it matter to student academic achievement (final unit grade/award) if attendance is online or on-campus (face-to-face),* and

RQ2 *What are the differences in instructional satisfaction and learning in online and on-campus mediums.*

In answering these questions the researcher sought to understand *what forms of technology were being used by the students as they studied the unit content.* Providing answers to these questions would then enable the researcher to better organise and deliver unit content to students who are increasingly moving to an online enrolment, and to better capitalise on the large investment that the university has made towards enhancing its use of a commercial learning management system.

Methods

Sample

All students enrolled in a teacher preparation degree in their third year of study at the University of Tasmania participated in this study in 2013. The subjects for the study included 203 pre-service teachers (86 per cent female and 14 per cent male). In terms of study mode 35 per cent studied the unit on-campus (70 per cent of whom were female); whilst 65 per cent studied the unit online (83 per cent were female).

In terms of delivery mode break-down of those who studied online their ages ranged from 18 through to 57 with the average age being 29. The on-campus student's ages ranged from 18 to 48, with the average being 23. This profile indicates that for this unit women accounted for the majority of students and that most students chose to study online. Furthermore, online students tended to be on average 6 years older than their on-campus counterparts.

The learning module (unit of study)

The unit that the pre-service teachers undertook occurred in the first semester of their third year of study. The module was a compulsory unit within their degree and was developed to teach pre-service teachers about health and wellbeing as it pertained to school aged children and their families. The *Health and Wellbeing* unit ran for 13-weeks (39 hours of study) and was comprised of a weekly one-hour pre-recorded lecture and one weekly two-hour tutorial. This delivery format was consistent with other units that the students had studied within their degree. Each week focused on a specific school or children's health or wellbeing topic such as bullying, nutrition, mental health, physical activity or drug education. This unit was chosen as it was taught by the lead researcher and had been delivered in dual format (both online and face-to-face) for two previous years meaning that the content and assessment practices were well developed.

In addition the unit had had been accredited by the degrees accreditation body meaning that it was considered appropriate for teacher education degrees across Australia. Students enrolled (self-selected) into the unit either fully online or on-campus; with all lectures delivered online by the lead researcher. Lectures were only delivered online as the Faculty only funded and allocated time for a weekly one-hour lecture per week for its undergraduate units regardless of study mode meaning that an on-campus and an online individual lecture format was not feasible.

The author tutored seven out of the eight tutorial groups. Of these groups the author tutored all the online students (four tutorial groups) as well as three of the four on-campus groups. A tutor (teaching assistant) received detailed tutorial notes (lesson plans) and their students received lectures and assignment assistance from the author online using the LMS, ensuring consistency across all tutorial groups. Learning was fostered through tutor feedback to the students upon completion and progress of weekly activities (tutorials), which were fundamental to assisting students to learn unit content. This was an important aspect of the unit as the tutors promoted student participation, moderated student responses and provided unit content and teaching examples.

The commercial platform used for the delivery of the online (e-learning) unit was *Desire2Learn*. The unit was designed so that all students accessed pre-recorded lectures using the LMS and all questions relating to the two assignments were only addressed by the unit coordinator (author) online, this was done to ensure consistency of responses and give students a greater understanding of questions being asked and responses being given.

Students were allocated to specific tutorial groups (learning forums) to complete their tutorials (Lab Activities) and were divided into two groups by their mode of study-either online or on-campus. This necessitated the four on-campus groups to also use the LMS to communicate with staff as well as to access unit lectures-which were used to impart unit theory, and tutorials were designed to put the theory into practice through scenario participation, resource sharing and case study discussions.

Prior to the tutorials all students were requested to read articles relating to the weekly topic from a set course text which was compiled to ensure a universal understanding of core social and health determinants (J-F, Pullen & Carroll, 2013). In tutorials students then discussed and applied the reading material to scenarios and showed their learning by producing 'tangibles' such as PMI charts, posters or web-quests, lesson plans-and through conversations (verbal for on-campus and text for online) with their peers and teaching staff. Within the online environment students participated in their tutorials through the weekly tutorial discussion forums via text and images (such as web-quests and Wordle see http://www.wordle.net/) and the on-campus students did the same only verbally in their tutorials or using the in-class interactive whiteboard. The tutorial tasks were designed to have students engage in theory, through practical explanations and applications within their tutorials and to then reflect on their own teaching practices through peer-review and peer modelling exercises. In addition all tutorials required students to share activities and reflections with others to foster a sense of community and provide critical peer feedback on authentic tasks and contexts which was assessed as an e-portfolio to showcase their learning journey (Chang, Liang, Tseng & Tseng, 2014; Tsai, 2010).

In terms of technology made available to the students in this unit the LMS *Weekly Content Page* (see Figure 1) shows that the audio-visual lecture was obtainable via a hyperlink which directs the student to the university's audio-visual portal where they can watch the lecture online or download for later viewing. The *Lecture Notes* hyperlink takes the student to the PowerPoint file of the recorded lecture which contains additional information in the Notes Pane. The *Tutorial* link takes the online student to the online activity (see Figures 2 and 3); on-campus students complete an equivalent activity in their face-to-face class. The *Discussion* hyperlink is the area where the online students comment and provide the completed tutorial activity material (refer to Figure 3); on-campus students do this in real time in their face-to-face tutorial.

Figure 1 Sample unit content page

Figure 2 Sample tutorial topic (containing embedded recording or video)

Section 1 Questions

Q1: An asthma attack can occur   [Please Select ▾]

Q2: One in how many children in Australia have asthma   [   ]

Q3: There is no cure for asthma   [Please Select ▾]

Q4: 8 Australians die from asthma each year   [Please Select ▾]

Q5: Asthma occurs when   [Please Select ▾]

      Please Select
      There is a family history of eczema
      Airways are inflamed and swollen
      Mucus production lessens in the airways
      All of the above

Q6: A common symptom for asthma is wheezing

Q7: Triggers for asthma include physical activity   [Please Select ▾]

Q8: Triggers for asthma include Spray deodorants   [Please Select ▾]

Q9: Triggers for asthma include Head lice   [Please Select ▾]

[CLICK HERE TO CONTINUE]

[Review Section 1 Slides]

Figure 3 Sample tutorial activity to validate student learning

Student use of technology for learning: The learning management system
Technology presents many opportunities to cater for learning. In order to maximise the technology benefits, whilst minimising limitations, teachers must understand how students use the available technology for learning (Trowler & Trowler, 2010). In terms of the current research the learning management system-*Desire2Learn*-was selected by the university based upon a selection requirement to make learning available online. This means that teaching staff have limited opportunity to modify the existing LMS architecture and features. In terms of technological features unit teaching staff largely control the learning environment and therefore the learners' experience of the technology, which influence students' perceptions of the learning technology (Aubusson, Schuck & Burden, 2009). This simple recognition of modifying the leaning platform is compounded when teaching staffs have limited opportunity to influence the architecture of the delivery platform.

In terms of UTAS' use of *Desire2Learn* as the platform for its' learning management system academic teaching staff are able to manage users (students) in terms of assigning them to groups and emailing them, learning materials (in the form of objects such as documents i.e. Word, PowerPoint, MP4 etc.) and learning events (assignment due dates, topic release) and connects learning content and learners together in a standardized manner, such as shown in Figure 1. *Desire2Learn* also provides the unit coordinator or instructor with a way to create and deliver content, monitor student participation, and assess student performance. As such the LMS is a software system designed to facilitate

learning, administration tasks as well as student participation in e-learning. As assessed in 2013 the LMS could be used by staff and students using desktop, laptop or Pad (Tablet) devices across multiple web browsers (though Google Chrome was the default due to its stability with the current version of *Desire2Learn*). The unit reviewed, as with other UTAS units, did support some forms of social media (Kaplan & Haenlein, 2010) but this was dependent on the instructor and for the examined unit the following were used in content delivery and tutorial activities:

1. Content Communities e.g. YouTube to view scenarios of health being taught in schools, and
2. Collaborative Projects e.g. Wikipedia being used to share analysis of teaching resources for different topics

However the examined unit as with other UTAS units did not support other forms of social media, despite anecdotal UTAS evidence that students used them for their study and so this current study sought to explore students' use of social media more broadly in their learning:

1. Blogs and microblogs e.g. Twitter and Tumblr;
2. Social Networking sites e.g. Facebook;
3. Virtual Game-Worlds e.g. *World of Warcraft,* and
4. Virtual Social Worlds e.g. *Second Life*

Method
Procedure
In the last week of the semester (week 13) all students regardless of study mode (online or on-campus) completed their last unit tutorial online. The reasoning for this is that during the last week of semester these students would be completing the unit's final assessment activity which was an electronic portfolio of their personal and professional learning within the unit. To undertake this electronic portfolio the students used the LMS's inbuilt e-portfolio tool. During this week the University's Quality Assurance Centre (UTAS, 2014a) invited -by email- all participants (online and on-campus) to complete the university's standard 15-minute online survey of evaluation of module teaching and content (eVALUate survey).

Also during week 13 the unit teaching coordinator asked in the final unit discussion board post (blog) what type of technology students had used to complete their study of the unit. These were referred to as resources or learning materials. Learning materials were: LMS lecture, LMS discussion board, Facebook, Twitter, Google calendar, You Tube, social bookmarking sites, web browser search engines, face-to-face meetings and online meetings. Students were asked which they had used and for what weeks.

Once marking for the unit was completed (3 weeks after the final teaching week) a report was run in the LMS using its inbuilt analytics tool to ascertain what aspects of the unit (such as accessing lectures, completing readings, attending tutorials and providing peer feedback) were used by students in completing the unit and comparing this to their final unit grade (award/mark).

Data Analysis
The collected data consisted of a review of the students' academic achievement results in the unit compared to their mode of study. Furthermore, data were gathered from participants' responses to the eVALUate survey. Quantitative data (closed questions) and qualitative comments (open questions) from the eVALUate survey were analysed

using statistical analysis (descriptive statistics and exploratory factor analysis) and inductive methods used to explore the open ended student responses. Student responses to the unit coordinators week 13 question of what types of Web 2.0 technologies they had used to complete the unit were tallied and described descriptively.

The survey (eVALUate) asked students a wide-range of questions ranging from engagement, content appropriateness through to questions associated with their learning and unit teaching practices. Two categories of questions were included: a quantitative evaluation of specific module aspects, and a qualitative evaluation that invites overall comments.

The quantitative part of the survey was composed of 11 closed questions. A set of statements was presented and participants were asked to express agreement or disagreement on a five-point Likert scale (1- unable to judge, 2 strongly disagree, 3 disagree, 4 agree and 5 strongly agree). The 11 UTAS eVALUate questions were grouped by the researcher to better understand student responses against more standard characteristics of teaching practice (McDonald, Kazemi & Kavanagh, 2013; Wieman & Gilbert, 2014):

1. *Processes induced* (3 items, e.g.: Q1. "The learning outcomes in this unit are clearly identified"; Q 4. "The assessment tasks in this unit evaluate my achievement of the learning outcomes"; Q8. "I am motivated to achieve the learning outcomes in this unit");
2. *Module activities* (2 items, e.g.: Q2. "The learning experiences in this unit help me to achieve the learning outcomes"; Q9. "I make best use of the learning experiences in this unit");
3. *Didactic competences* (3 items, e.g.: Q5. "Feedback on my work in this unit helps me to achieve the learning outcomes"; Q6. "The workload in this unit is appropriate to the achievement of the learning outcomes"; Q10. "I think about how I can learn more effectively in this unit");
4. *Teaching materials* (1 item, e.g.: Q3. "The learning resources in this unit help me to achieve the learning outcomes");
5. *Teaching staff performance* (2 items, e.g.: Q7. "The quality of teaching in this unit helps me to achieve the learning outcomes"; Q11. "Overall, I am satisfied with this unit).

With regards to the qualitative aspects of the eVALUate survey, the following two questions were asked for overall student comment:

Q12. What are the most helpful aspects of this unit?
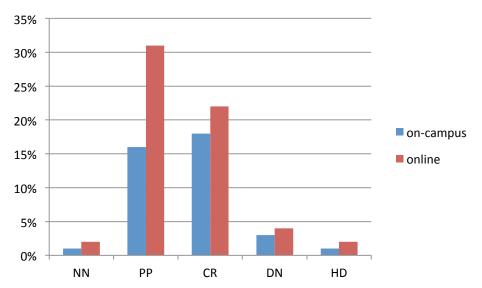Q13. How do you think this unit might be improved?

Results
The results are presented according to the research questions and the underlying assumptions behind each research question.

RQ1 *Does it matter to student academic achievement (final unit grade/award) if attendance is online or on-campus (face-to-face)* sought to understand if student study mode, online or on-campus, affected their end of unit result or award (grade or mark).

At the completion of the unit student assignment results were tallied and results compared to mode of study, as indicated in Figure 4. An independent-samples t-test was conducted to compare achievement results between the two cohorts. Results indicate that there was not a significant difference in the achievement scores (*M* = 7.8, *SD* = 8.46) as a result of study mode (*M* =12.2, *SD* = 13.46) conditions; *t(4)*= -1.62, *p = 0. 180.*

(Final Module Grade: NN fail <49%, PP pass 50-59%, CR credit 60-69%, DN distinction 70-79% , HD high distinction >80%)
Figure 4 Module academic performances by study mode

Students in class attendance (on-campus) was monitored by the teacher recoding "present' or "not" against the class registry. As on-campus students had full access to the LMS module-that is they could see and do what their online counterparts could-if they were absent for an on-campus class they could make up for it by completing the online activity. As such attendance for on-campus students was recorded as either being present during the on-campus class or completing the online activity for their missed class. Online student's attendance was determined by them accessing the weekly online activity. This was monitored by using the "view attendance" function within the LMS.

In addition, using the LMS "view user progress" function lecture access was also able to be determined for all students. One-way analysis of variance (ANOVA) was calculated on students' tutorial attendance (either in class or online) and final module grade. The analysis indicated that there was a significant effect on final unit grade and tutorial attendance at *p* < .05 level, *F*(1, 12)= 14.03, *p* < .025. Post hoc comparisons using the Turkey HSD test indicated that the mean score for attendance above 80 per cent (*M* = 4.20, *SD* = 1.30) was significantly different when compared to attendance below 80 per cent (*M* = 2.60, *SD* = 0.82). In terms of assessing-and presuming listening to-the online lectures the rate of access was significantly related to final student grade *F*(1,4) = 3.995, MS=24.83, *p*=.001. Lecture access rates indicated that students who accessed lectures more than twice-i.e. The same weekly lecture more than once-achieved significantly higher end of unit marks than students who either did not access weekly lectures or only accessed them once (*p*=.000).

RQ2 *What are the differences in instructional satisfaction and learning in online and on-campus mediums.* To understand this variable the standard university unit online eVALUate survey was used.

Student survey closed questions
The quantitative component of the eVALUate survey consisted of 11 questions with ratings from 1 (unable to judge) through to 5 (strongly agree). Table 1 depicts the percentage of student who *strongly agreed/agreed* to the 11 questions offered in the eVALUate survey as categorised into 5 themes.

Table 1
eVALUate agreement by study mode

	Processes induced		*Module activities*		*Didactic competences*		*Teaching materials*		*Teaching staff performance*	
Percentage of students *Strongly agree/Agree*	96.7 62.1 80.0	96.5 89.7 93.1	70.0 86.7	89.7 96.3	70.0 52.1 93.4	79.3 67.9 100	80.0	93.1	76.7 64.3	86.2 86.2
First column shows on-campus, response rate 40%					Second column shows online, response rate 37%					

Student survey open-ended questions
The qualitative component of the eVALUate survey consisted of 2 open ended questions. In relation to the first open ended question (*What are the most helpful aspects of this unit?*), 21 responses (10%) were made which overwhelmingly stated that the unit coordinator and teacher "knew the course content well, was interested and made it relevant to classroom practice" and that "the resources were fantastic".

In response to the second open-ended question (*How do you think this unit might be improved?*), 17 responses (8%) were offered by the students. One student commented that "discussion board posts should be worth marks, we put a lot of time into them and they are worth no marks", whilst another student suggested "more attention to weekly workload-it seemed huge."

Differences between on-campus versus online study and technology used for study.
A repeated measures analysis of variance (ANOVA) was conducted to examine the differences between learning on-campus versus learning online (Factor 1, 2 levels) and students access to unit and Web 2.0 resources [learning materials were: LMS lecture, LMS discussion board, Facebook, Twitter, Google calendar, You Tube, social bookmarking sites, web browser search, face-to-face meeting and online meeting] (Factor 2, 10 levels). There was a multivariate effect of learning mode $F(1, 75)= 29.03$, $p <.001$ $\eta^2=0.26$; Wilks Lambda $= 0.70$, indicating that learning mode, on average, affected a students use of the named technologies, on-campus (*M* 4.25, *SD* 0.06) compared to online (*M* 3.60, *SD* 0.07).

There was also a multivariate effect for the type of learning material $F(1, 72)=6.81$, $p<.001$ $\eta^2=0.55$; Wilks Lambda $= 0.62$, indicating that, when collapsed across delivery mode, there was a significant difference between the level of importance accorded to each learning material.

Finally, there was a significant interaction effect between delivery mode and learning material F(1, 72)=8.02, *p<0.001* η^2=0.34; Wilks Lambda = 0.65. This indicates that the student study method had different effects on the importance of the different learning technologies used. Pairwise comparisons indicated that LMS lecture, LMS discussion board and web browser searches were rated as significantly more important for online students than for on-campus students. A single sample *t-test* also indicated that the *means* for all learning materials, in both on-campus and online studying, were significantly greater than the midpoint on the scale (3) (all *p>*.001) except for You Tube (*ns*) (Bonferroni adjustment = .004).

An independent-samples *t*-test was conducted to compare unit achievement and study mode. There was no significant difference in the scores for achievement (*M* = 7.8, *SD* = 8.46) and study mode (*M* = 12.2, *SD* = 3.46) conditions; *t(4)*= -1.62, *p= .180.* These results suggest that a student's study mode does not affect their overall score (result) in the unit.

Discussion

The current study aimed to provide a snapshot of the extent and nature of students' use of technology in one university undergraduate unit. The results suggest the findings from the present study support the work of earlier researchers (see De Boer and Collis, 2005) and Normand Littlejohn and Falconer (2008)) in demonstrating that helping instructors (course developers and teachers) to identify teaching and learning tools that students access for study is feasible and practical—if not time consuming.

Whereas the De Boer and Collis (2005) research restricted their study data to teaching staff the current study relied upon student responses as it is their learning that the present study was concerned with. Thus the current study gives students a 'voice' in the future pedagogical and technological decisions that will be made to this unit but also highlighting to others what technological tools students are using in their study. On another point of departure from previous studies (De Boer & Collis, 2005; Normand Littlejohn & Falconer, 2008), it should be stressed that the current study findings for a preference for students choosing online delivery and accessing more social media tools was revealed in a disciplinary context where teaching has traditionally been via, and is still dominated by, face-to-face delivery methods. Indeed, it might therefore be argued that the current study findings have relevance for degree redesign throughout the humanities—where on-campus, face-to-face teaching is and has been the main stay of educational delivery and student learning.

By understanding the instructional deign and pedagogical design principles behind course design and delivery, instructors (teachers) are able to better manipulate the available technologies to better support student learning and course progress (Pullen, 2013). Indeed in a much larger study (Pullen, 2013) it was determined that students valued the interactivity that online learning provides but do feel "hemmed-in" or "restricted" by the technology employed in the learning as offered by the LMS. This finding was also revealed in the current study's open ended question responses in that the workload particularly around assigning marks to discussion board posts was viewed by students as needing to have marks assigned in order to recognise student efforts—rather than it being designed as a mechanism to promote learning and peer collaboration and interaction. However, the teaching staff in this unit treated online discussion board

comments much in the same way as comments from student's in on-campus tutorials - that is as a way to consolidate and confirm learning and to offer redirection as required. So regardless of study mode "active" participation in the unit was encouraged and as results indicate tutorial attendance, and presumably active participation, increases final unit grade.

The current study findings have shown that students', regardless of study mode, were using technologies other than those that were provided by the university through its LMS. This might indicate that the university needs to maximise student preference for Facebook and online meeting software such as Skype or other voice over the internet services (Voice over Internet Protocol-VoIP-see Dias, Gabi, Rodrigues, Souza & Perkusich, 2014). The use of VoIP for online students might also being indicating a desire for more synchronous communication between peers and perhaps with staff.

A number of determinations can be interpreted from the current study;
1. There is a move in the tertiary education sector for more online course delivery, indeed UTAS offers 69% of its units (modules) with an online presence and in the module examined in this paper 65% of students studied online;
2. Regardless of study mode the end of unit grade was not affected by the student mode of study, that is on-campus or online (distance);
3. A students final grade is affected by their attendance in tutorials, that is the students who attended more tutorials over the length of the unit perform better than those students who do not attend all of the tutorials;
4. Accessing each lecture (presuming listening to them) more than twice improves overall grade;
5. For this unit, at least, online students perceived how it was structured in terms of content and activities higher than the on-campus students, and
6. In terms of Web 2.0, or social media, online students valued social media use for their learning more so than on-campus students. Furthermore, online students were using technologies that were not provided by the university's LMS such as Facebook, Skype and other VoIP to 'stay in touch' with peers in real-time (synchronous), whereas their study mode was asynchronous (delayed).

The current paper has given insights in student use of online learning tools and pedagogical approaches by using data sets which most, if not all, higher education teaching staff have access to, but perhaps don't capitalise on, to examine unit delivery and student engagement and achievement. This new knowledge can then be, and is, used to reshape and refine future iterations of this unit so that course delivery and design principles better reconcile teacher and student expectations and use. Through such an approach others can see how pedagogical methods and technology tools can be better incorporated into unit design to capitalise on tools that students are using in their own way for studying and engaging in course content, such as using VoIP for online asynchronous students to have synchronous interactions.

Conclusion
The current study showed some interesting insights into one cohort of students studying a compulsory health education unit within their undergraduate teacher preparation degree. Whilst the current study did not show a difference in delivery mode and final module grade it did show that students who attended more tutorials and accessed lecture material more often perform better than those who did not. Furthermore, online students

place a greater value on the use of social media as an integral part of their learning than do on-campus students-despite the university's LMS not utilising the students chosen Web 2.0 technologies. These findings are useful in future unit deign and delivery in that it will help the designers and teachers put more emphasis into certain delivery tools, such as the use of pre-recorded lectures and discussion board posts as well as "prompting" or encouraging students to attend tutorials and listen to lectures-as these facets have been shown to improve student performance, at least in this study. The author as unit coordinator is also investigating how to assist online asynchronous students have access to more synchronous means of communicating with their peers and teaching staff. Such an approach may be incorporating a webinar (a VoIP session in which many students are online at the same time as the teaching staff and communicating to each other in real-time via the use of services such as Skype and text chat).

In terms of educational practice and unit design and delivery the current study has similar findings to that of Kennedy *et al.* (2008) in that course designers and universities need to consider what types of technology they will offer to students and staff and that the technology chosen should support the key aspects of the sector—that is student learning. This requires course designers and teaching staff to understand what technologies the students' are currently using and what are the educational parameters of those chosen forms of technology. This cannot be achieved without examining student access and use, which is something the current study, has done and will now inform future design and delivery of this unit. For example the author will investigate ways to incorporate content and discussions that occur in the LMS and replicate them in social media such as a unit Facebook site and a wiki presence. This way students will be able to learn unit content from any device and location without having to log into the university's LMS. This will enable the unit content and key discussions to be made available to the students in a format and online delivery space that they currently use for socialisation and convenience.

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