A 2010 Snapshot of Educational Technology use by CSU students

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Ensuring an excellent learning experience is critical for the modern Australasian university. This is particularly important for an institution like CSU, which has the majority of its students studying at a distance. This paper presents a snapshot of student usage and attitudes towards technologies for learning and teaching, drawing on an institution wide online questionnaire in 2010 completed by 3952 students. One of the most interesting findings from this study is that students' use of educational technologies may be driven primarily by the need for their studies to be flexible and manageable around work and family demands. Students appear to be 'digital followers' rather than early adopters but are nevertheless very regular users of technologies in their own lives, and appear very receptive to the frequent use of technologies in their studies.

Keywords: Technology adoption, eLearning, Educational Technology use, students, Charles Sturt University

Introduction

Charles Sturt University has a very large and diverse cohort of students studying both undergraduate and postgraduate degrees, with many studying by distance or online. CSU has been one of the largest providers of distance education in Australia and consequently has maintained a keen interest in the use of educational technology to enhance delivery of this mode. As a university that engaged early with the development of learning management systems and other technologies that support the online delivery of higher education courses, CSU are in a good position to reflect upon the use and developments of our educational technology over time. With this in mind, it is important to ensure we build and promote sustainable systems of educational technologies that address the needs and uses of all stakeholders. Consequently, this study was initiated to explore the nature of students' use, preferences and familiarity with the use of educational technology while studying at CSU, either via distance or as an internal student.

Background

In the early part of this decade, much of the academic debate about attitudes towards and use of technology by university students was framed by Prensky's (2001) conjecture that today's students are 'Digital Natives', while their teachers are 'Digital Immigrants', and similar conceptualisations of students as being part of a 'Net Generation' who had grown up surrounded by technology use and therefore had much greater expectations of a technology enriched learning experience than previous generations (Oblinger and Oblinger, 2005). This led to a number of large empirical studies which tended to find, firstly, that age differences were not the primary factor distinguishing between student attitudes towards and use of technologies in their private lives and studies, and secondly that many students fitting the age criteria for being a 'Digital Native' or part of the 'Net Generation'

were not in fact frequent or highly competent users of a wide range of technologies, and were not calling for a technology driven transformation of their university learning experiences. For example, in the largest Australian study in this area, Kennedy, Krause, Gray, Judd, Bennett, Maton, Dalgarno, and Bishop (2006) surveyed 2588 students at three universities in 2006, and found substantial diversity in technology usage and found that this diversity was largely not attributable to student age (see Kennedy, Judd, Dalgarno, & Waycott, 2010). Studies overseas undertaken during the same time period found similar results and in general tended to present a more complex picture than that proposed by commentators such as Prensky (see, for example, Salaway et al., 2007 in the US, and Jones, Ramanau, Cross & Healing, 2010 in the UK).

Alongside this empirical work, a number of scholars have also criticised Prensky's methods (see, for example, Sheely, 2008) while others, such as Bennett, Maton and Kervin (2008) have commented on the fervour with which his ideas were taken up, suggested that educators need to take a more measured stance and called for "considered and rigorous investigation that includes the perspectives of young people and their teachers, and genuinely seeks to understand the situation before proclaiming the need for widespread change" (p. 784). Senn (2008) also noted that early ICT implementation neglected consideration of student preferences and that staff willingness and/or institutional capacity to provide the level of online interaction promoted by some educators and theorists were often limited.

Communication and interaction between students and students, and students and their lecturers remain key elements of learning in higher education and many educational technologies have had a significant impact on the ways in which this communication is facilitated. The universal use of the internet in higher education has brought with it new social norms in terms of social interactions (Dykman & Davis, 2007), however, less universal has been the development of educators' communication skills to incorporate these changes into their teaching (Moller, Foshay & Huett, 2008). For an institution to begin to appropriately address these issues they must first understand how their students and staff are using ICT and what tools they prefer.

Recent studies have begun to present a picture of noticeably greater usage of technology by university students. For example the latest in a series of annual studies of undergraduate students' use of technology undertaken by the EDUCAUSE Centre for Applied Research in the US, which involved a sample of 3,000 students in 1,179 colleges and universities, found: very high levels of ownership of technologies such as laptops (87%), iPods (62%) and smartphones (55%); very high proportions of students using Facebook (90%), reading Wikis (85%) and blogs (72%) and sizable minorities also using other tools such as Twitter (37%) and contributing to blogs (43%); and very high proportions of students agreeing with a series of statements about the benefits of technology for learning (Dahlstrom, de Boor, Grunwald & Vockley, 2011).

The Study

CSU Context

Charles Sturt University is a multi-campus university with a large proportion of its students studying at a distance rather than on campus. Specifically, in 2010 23,367 students were enrolled in Distance mode, 9,568 in On Campus mode and 5,029 in a mixture of On Campus and Distance modes. In 2010 the University employed 673 full-time equivalent academic staff, in four faculties (Arts, Science, Business and Education), as well as adjunct staff in a number of partner institutions within Australia and offshore. The University has required all subjects to have an online presence containing at least the subject outline and a discussion forum since the late 1990s, with online assignment submission available in all distance subjects since the early 2000s. The Sakai based Learning Management System (named Interact within the University) was introduced in 2008, providing an announcements tool and a resource sharing tool in all subjects and tools such a blog, a wiki and a chat room at the discretion of the subject coordinator.

Questionnaire Design

The questionnaire was designed in close cooperation with staff from the University of Waikato, New Zealand in mid-2010. The questionnaire was based on the following surveys: University of Waikato, Staff and Student eLearning surveys 2008; ECAR Research study 6, 2007; Student Information and communications Technology project, University of Edinburgh; Association of College and Research Libraries, Informing Innovation survey 2009; VERSO, 2008; UNSW@ADFA, Students' ICT Experience, 2008; Victoria University, Student Questionnaire, 2009; Macquarie University, Student Experience of Technologies in Universities, 2010; University of Wollongong Survey, 2008; UTAS, Staff and Student experience with eLearning technology surveys 2010.

The questionnaire was thereafter customised to address key concerns about educational technology at CSU and had the following sections: Demographics – Personal; Demographics – Institutional; Technology Access; Use and awareness; Features currently used; Features they would like to use to support their learning; Views and Experience; University Services. As well as the questionnaire completed by students, which is discussed in this paper, a similar questionnaire was designed and administered to CSU staff.

Administration and Sample Demographics

The questionnaire was made available online in Survey Monkey between 13 July 2010 and 1 August 2010. It was widely promoted in CSU and its partner institutions through general communication channels and also through CSU's micro-blogging tool Yammer and a learning management system site called "About ICT integration" (which had just under 500 members). Ethics approval for this survey was obtained from the CSU Learning & Teaching Services Ethics Committee.

The survey was conducted anonymously and it was made clear that even though Survey Monkey used the IP address of the computer to enable students to continue if they exited the survey before the end, this would not be used to identify their contribution. It was also made clear that any publication as an outcome of this survey would not identify any individual or any particular subject in any way.

Students were encouraged to complete the full questionnaire, but could exit the survey at any time and return later to finalise it on the same computer or exit without completing. It was stated that participants had the right to withdraw from the research at any time, without penalty and they could also contact the author of the paper if they wished to withdraw after having completed part of the survey. The survey took approximately between 30 and 45 minutes to complete. This paper reports summaries of the responses to a subset of the questions in the survey relating to general attitudes towards and usage of technology, attitudes and usage of selected educational technologies, and usage of the CSU Learning Management System. Generally items have been chosen for reporting where it was considered that their usage was sufficiently common across the sector to warrant wider interest.

The survey was completed by 3952 students, including 1314 males, 2625 females, and 13 not stating their gender. There were 753 respondents from the Faculty of Arts, 882 from Business, 1000 from Education and 1221 from Science, with 96 not responding to the question. 1278 respondents indicated that they were aged 40 or over, 1419 were 26-39, 1250 were 18-25 and 5 indicated that they were less than 18. Of the respondents, 403 were international students and 3453 were domestic students. In terms of study mode, 2673 were distance students, 814 on-campus and 369 were mixed mode. 998 respondents identified as Undergraduate (Year 1), 541 as Undergraduate (Year 2), 838 as Undergraduate (Year 3 or more), 1081 as Post-graduate (Course work), 202 as Post-graduate research or higher degrees and 196 as other.

Findings

Attitude towards technology

Students were asked to choose which of a series of descriptors relating to their attitudes towards new technologies best described themselves. The descriptors ranged from "I love new technologies and am among the first to experiment and use them" to "I am sceptical of new technologies and use them only when I have to". The results (see Figure 1) show a reasonably even distribution of responses. At one end of the scale, 8.7% of students indicated that they loved technologies and were among the first to use them, and 23.5% of students indicated that they liked technologies and used them before most people they knew. At the other end of the scale 3.8% of students indicated that they were sceptical of new technologies and 8.9% indicated that they were one of the last to use new technologies. The largest group of respondents (31.6%) were in the middle, indicating that they use technologies when other people start to use them.
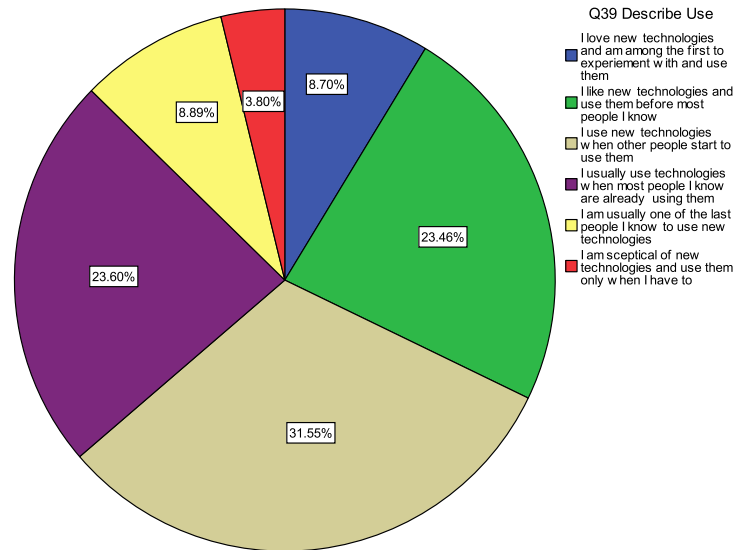
Figure 1: Attitudes towards new technologies

Usage of technology in general

Students were provided with a list of 60 technologies, tools and online information sources and asked to indicate in each case whether they had never heard of the technology, heard the name but were not sure what it was, knew what it was but had not used it, used it occasionally, or used it regularly. Table 1 shows responses relating to a selection of 16 of these 60 technologies. Tools used regularly by the majority of students included email (94%), spreadsheets (58%) and CSU Interact, the university's Sakai based Learning Management System (79%). Tools used either regularly or occasionally by the majority of students included presentation software (49% regularly and 36% occasionally), social networking (46% regularly and 27% occasionally), electronic library resources (46% regularly and 31% occasionally), and discussion forums (36% regularly and 36% occasionally). At the other end of the spectrum, the majority of students had either not heard of or were unsure what the following technologies actually were: ePortfolios (41% not heard of, 26% unsure of), web conferencing (34% not heard of, 23% unsure of), and electronic simulations and virtual worlds (34% not heard of, 20% unsure of). Technologies for which there was divergent levels of awareness and use, included Google Scholar (18% never heard of, 21% using regularly) and wikis (12% never heard of, 16% using regularly).

Table 1: Technology Use and Awareness

	Never heard of it (1)	I've heard the name but not really sure what it is (2)	I know what it is but have never used it regularly (3)	I use this occasionally (4)	I use this regularly (5)	*Mean*
Social Networking	.5%	2.7%	23.1%	27.3%	46.4%	4.16
Google Scholar	18.1%	13.3%	19.4%	28.0%	21.2%	3.21
Electronic Library Resources (e-journals/electronic databases)	2.1%	4.9%	16.9%	30.5%	45.6%	4.12
ePortfolios	41.2%	25.6%	21.9%	8.3%	3.0%	2.06
Webconferencing (e.g. Elluminate, Wimba, Dim Dim)	33.7%	23.4%	31.6%	8.2%	3.2%	2.24
CSU Interact	1.6%	2.4%	4.8%	11.8%	79.4%	4.65
Email	.2%	.1%	1.6%	3.7%	94.4%	4.92
Discussions Forums	.9%	3.0%	23.4%	36.6%	36.1%	4.04
Wikis	12.2%	11.7%	30.5%	29.9%	15.6%	3.25
Electronic Simulations and Virtual Worlds (e.g. Second Life)	33.8%	20.3%	40.2%	4.0%	1.8%	2.20
Social Bookmarking (e.g. Delicious, StumbleUpon)	50.6%	16.7%	24.7%	5.5%	2.6%	1.93
Microblogging Services (e.g. Twitter, Tumblr, Yammer)	10.2%	20.0%	57.3%	8.3%	4.1%	2.76
eBooks	4.2%	10.3%	44.5%	27.4%	13.6%	3.36
Podcasts	4.8%	13.5%	42.5%	28.3%	10.8%	3.27
Spreadsheets (e.g. MS-Excel)	.4%	1.5%	10.6%	29.2%	58.4%	4.44
Presentation software (e.g. PowerPoint, Keynote)	.5%	1.8%	12.7%	36.2%	48.8%	4.31

Attitude towards educational technologies

In order to gauge students attitudes towards the use of technology for learning, students were asked to nominate the "single most important benefit for me of using educational technology in my subjects", choosing from six options. As shown in Table 2, the most frequently chosen benefit was "access (would have been unable to attend some or all of the required on-campus classes e.g. due to distance, family commitment)" (38%), while 27% chose the somewhat related reason "personal management (able to study at times and in places convenient for me". Only 24% chose "improving my learning", while only 8% chose "communication with teachers and classmates". These results would suggest that access to information in a convenient way is still the most important application of technology. The low proportion of students (1%) indicating that they could see no benefits in the use of technology is encouraging.

Table 2: Most important benefit of using educational technology

The single most important benefit for me of using educational technology in my subject	
Improving my learning (1)	24.4%
Access (2)	37.7%
Personal management (3)	27.2%
Communication with teachers and classmates (4)	7.8%
No benefits (5)	1.3%
Other (6)	1.6%
Mean	2.29

Use of the Learning Management System

Students were asked to respond to three statements about their overall experience of the university Learning Management System (LMS), which goes by the tag "CSU Interact", rating the statements on a scale from "very strongly agree" to "very strongly disagree" and including an option for "not applicable". The first statement was "My overall experience of the functionality of CSU Interact has been positive" with 81% of students agreeing and 10% of students disagreeing. The second statement was "My overall experience of the availability of CSU Interact has been positive" with 80% of students agreeing and 11% of students disagreeing. The final statement was "My overall experience of the use of CSU Interact has been positive" with 81% of students agreeing and 9% of students disagreeing. Table 3 shows all responses to the three statements.

Table 3: Overall experience of using CSU Interact

	Very strongly agree (1)	Strongly agree (2)	Agree (3)	Uncertain (4)	Disagree (5)	Strongly disagree (6)	Very strongly disagree (7)	Not applicable (8)	*Mean*
My overall experience of the functionality of CSU Interact has been positive	14.1%	26.7%	40.1%	7.7%	6.4%	1.6%	2.1%	1.2%	2.85
My overall experience of the availability of CSU Interact has been positive	14.6%	26.9%	38.7%	8.0%	6.9%	1.9%	1.8%	1.3%	2.85
My overall experience of the use of CSU Interact has been positive	14.2%	27.1%	39.7%	8.5%	5.8%	1.6%	1.8%	1.3%	2.83

Current and desired usage of selected technologies in learning

Students were asked to indicate the frequency with which their lecturers use each of 34 technologies in their subjects and the frequency with which they "would like" their lecturers to use each of these technologies, on a scale where 1 = "more than once per week" and 5 = "never". These results were then collapsed to a 3 point scale, from "weekly or more" to "never". Table 4 shows the percentage of responses in each category for 10 of these technologies. By far the most frequently used technologies were the discussion forum and the online announcements tool in the LMS. Such tools have been in use at CSU for a number of years and have been very widely used in both on campus and distance mode teaching. Other tools being used at least sometimes in some subjects taken by the majority of respondents but generally less than weekly, included the chat room, online assignment marking, and online quizzes. It is interesting to note that a sizable minority of students have experienced the use of wikis, blogs and lecture recordings in their studies.

By comparison, students' desired frequency of use of technology in their studies is noticeably higher than the actual frequency. Technologies with particularly high desired use but only moderate actual use include lecture recording (58% desiring weekly use, while only 18% reporting actual weekly use), the chat room (52% desiring weekly use, while only 27% reporting actual weekly use) and online quizzes (40% requesting weekly use, while only 14% reporting actual weekly use). Other technologies for which a large proportion of students desire at least occasional use include the provision of subject information on handheld devices (50% desiring use, while 15% reporting actual use), online assignment marking (94% desiring use, while 61% reporting actual use), and Blogs (64% desiring use, while 32% reporting actual use).

Table 4: Frequency of use and desired use for selected educational technologies by lecturers

	Frequency of Current Use			Frequency of Desired Use		
	Weekly or more (1)	Less than weekly (2)	Never (3)	Weekly or more (1)	Less than weekly (2)	Never (3)
Announcements	54.5%	40.9%	4.7%	74.3%	24.3%	1.4%
Lecture recordings	18.1%	25.5%	56.5%	58.4%	27.7%	13.9%
Discussion forums	63.6%	26.8%	9.6%	72.2%	21.7%	6.0%
Chat room	27.0%	30.2%	42.8%	52.3%	28.1%	19.6%
Wikis	12.7%	29.7%	57.5%	33.2%	36.0%	30.8%
Blogs	11.1%	21.3%	67.6%	31.7%	32.3%	36.0%
ePortfolios (PebblePad)	6.6%	17.5%	75.9%	22.0%	33.4%	44.60%
Assignments - getting marked work back online	7.8%	53.1%	39.0%	30.1%	63.4%	6.50%
Quizzes for learning/self review/assessment	13.8%	41.4%	44.8%	40.4%	48.8%	10.80%
Subject information on my mobile device (handheld)	6.7%	8.8%	84.4%	28.5%	21.0%	50.50%

Comparison by Study Mode

A Multivariate Analysis of Variance (MANOVA) was also used to compare the mean frequency of use of a range of technological tools within subjects undertaken by respondents enrolled on campus and in distance mode (see Table 5). Students were asked to indicate the frequency with which their lecturers used specific technologies in their teaching on a scale where 1 = "more than once per week" and 5 = "never". The results show small but statistically significant differences for most of the selected technological tools. Particularly noticeable differences include announcements, ePortfolios and tracking progress and grades e.g. Gradebook (all of which were used more in on-campus or mixed mode subjects than distance subjects).

Table 5: Frequency of use of specific technologies lecturers currently use

	Study mode Mean response on frequency of use of specific technologies lecturers currently use					
	Distance (n = 2673)	On-campus (n = 814)	Mixed (n = 369)	All students (n = 3952)	F	p
	Mean	Mean	Mean	Mean		
Announcements	2.56	2.08	2.08	2.42	83.518	<.001
Online readings	2.93	2.73	2.59	2.86	15.678	<.001
Interactive video teaching	4.40	3.99	4.23	4.30	39.145	<.001
Animation	4.60	4.08	4.27	4.47	78.950	<.001
Lecture recordings	4.18	3.55	3.92	4.03	67.051	<.001
Discussion forums	2.16	2.81	2.51	2.32	78.143	<.001
Chat room	3.55	3.73	3.75	3.60	4.460	.012
Wikis	4.17	4.11	3.94	4.14	6.146	.002
Blogs	4.35	4.16	4.31	4.31	6.625	.001
ePortfolios (e.g. PebblePad)	4.60	4.32	4.38	4.53	26.988	<.001
Assignment – submitting work online	3.16	3.46	3.30	3.23	34.503	<.001
Assignment – getting marked work back online	3.93	3.76	3.90	3.90	6.541	.001
Quizzes for learning/self review/assessment	4.11	3.46	3.70	3.94	86.122	<.001
Tracking progress and grades (e.g. Gradebook)	4.58	4.28	4.37	4.50	27.776	<.001
Subject information on my mobile device (handheld)	4.71	4.38	4.60	4.63	28.760	<.001
Notifications sent to my mobile device (handheld)	4.71	4.52	4.71	4.67	11.652	<.001

Discussion and conclusion

The respondents to the question about students' attitudes towards technology suggest that only a small proportion of respondents (8.7%) "love technologies and are among the first to experiment with and use them " and a minority (23%) "like new technologies and use them before most people" (see Figure 1). The average CSU student who responded to the survey in 2010 was clearly a digital follower, rather than an early adopter of new technologies. However, it is interesting to compare the frequency of usage of technologies such as Social Networking by the students responding to this 2010 questionnaire with the frequency reported by the students responding to the 2006 questionnaire reported in Kennedy et al. (2007). As shown in Table 1, 73% of students responding to this questionnaire used Social Networking regularly or occasionally, compared to only 44% of students responding to the 2006 questionnaire. On the other hand, the percentage of these students using presentation software such as PowerPoint regularly or occasionally (84%) was very similar to 89% reported by Kennedy et al. (2006). This suggests that even though the self reported orientation to technology does not imply that these students are necessarily 'Digital Natives', their regular use of both productivity technologies and social technologies does suggest that they are now well prepared for the use of technologies for learning.

Students' responses to the question about the most important benefit of using educational technology suggested that students' current use of educational technologies appeared to be driven by a desire for flexibility in their non-virtual world, with 38% specifying "Access" and 27% choosing "Personal management" as the most important benefit and only 24% choosing "Improving my learning" (see Table 2). Broadly speaking, the technologies most frequently used by students tended to be those that facilitated asynchronous communication, including email (see Table 1), and online forums and announcements (see Table 4) as well as technologies used for assignment production such as spreadsheets and presentation software (see Table 1). The desired shift in

educational technology use as expressed by students (see Table 4) tended to focus on those that support 'time-shifting' or increased flexibility, such as increased use of online announcements, recorded lectures and asynchronous discussion forums. Also noteworthy was a desire for an increase in the use of synchronous interaction through chat rooms.

Student responses to the questions asking them about their desired frequency of use of a range of technologies suggest that in general they have a very strong preference for the use of technology in their learning, with the majority of students wanting to see technologies such as online announcements, recorded lectures and discussion forums used at least weekly. Looking at this in conjunction with their responses to the questions about the experience with CSU's online learning platform, Interact (for example 82% agreeing that their overall experience of the functionality of CSU Interact has been positive), provides an overall impression of a student body very enthusiastic about the ways in which technologies are being used and very keen for increased usage. This is consistent with the results of the most recent EDUCAUSE study in the US (see Dahlstrom, de Boor, Grunwald & Vockley, 2011).

The comparison of the use of technologies by distance and on campus students provides some interesting findings, which may reflect the differing learning needs of these cohorts as well as the opportunities provided by their lecturers (see Table 5). For example, the greater use of forums and chat rooms in distance mode subjects probably reflects the fact that for these students such technologies provide the main avenues of communication with their peers and lecturers. Similarly, the higher use of electronic assignment submission in distance subjects reflects the fact that for these students the only other alternative is to mail their assignments, and because they have to arrive at the university before the due date, this results in lost time to work on the assignment. By comparison, on campus students can hand deliver their assignments and so electronic submission is not as important. The greater use of electronic announcements in on campus subjects may reflect the fact that these announcements often relate to late breaking information about the subject delivery. The higher use of quizzes for on campus students is somewhat surprising, although the usage appears to generally quite low. The higher use of electronic return of assignments in on campus subjects is also surprising, although the difference between distance and on campus respondents is relatively small in this case.

A recent study at CSU of distance student use of technology including virtual lectures and asynchronous forums and grades found that the more the students engage with these online resources the greater their academic achievement (Crampton, Ragusa & Cavanagh, 2012). The authors noted that it was perhaps the students who realised the value of the resources, students perhaps with higher self regulation skills, who were more likely to engage with the resources and that development of student led regulation/ self directed leaning skills should be included early in a students' academic career (Crampton, Ragusa & Cavanagh, 2012).

The desire for an increase in the use of online marking and quizzes (see Table 4) was consistent with internal subject evaluations in which students continued to request improved mechanisms of feedback. Quizzes and online marking promote self directed study as well as facilitating the return of feedback during the session, at a time that is maybe most productive for improving learning. CSU's large contingent of distance students for whom the practical realities of their sometimes very remote locations can prevent the timely return of some assessment items. Therefore it could be argued that just as educators are starting to see technology as a means of addressing existing barriers rather than just a call by some to totally change how they teach, so too students are beginning to understand the role technology can play in improving experiences they currently value such as feedback in a more appropriate and useful manner.

It is important to note that apart from the use of the subject outline tool and the discussion forum, there are no mandatory requirements for any particular educational technology to be used in any class at CSU. For some aspects of this survey (such as Table 4 which displays results of students' actual-versus-desired use of particular technologies) results may be skewed due to the possible lack of student experience of a particular tool. For example, it may be difficult for a student to determine that they would like to use more blogs or wikis in their class interactions if they have little or irregular experience of these tools, especially in this context. As most students indicated they wait for others to take the lead in terms of new technologies (see Figure 1), it is difficult to know to what extent we need to further adopt such technologies on this basis alone. Apart from communication and administrative functions (email, chat, resources, etc), and tools that enable students to study in ways that enable them to work their study commitments around work and family obligations, it may be assumed that technologies should still be chosen for their pedagogical benefits, rather than student desire alone.

Looking forward, we see the emergence of more mobile learning initiatives and strategies and would suggest that institutions learn from past blind forays into LMS. Important questions that need to be asked are "what

gap/s will be addressed by such technologies?", "what are student needs?" and "what pedagogical affordances will mobile learning address?". Our results would suggest that space and opportunity to explore need to be provided to staff and students as a first step down any new paths so that increasingly limited resources can be channelled in the most effective ways rather than be driven by the technically savvy early adopters.

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