

Student use of technologies for learning – what has changed since 2010?

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This paper reports on a large longitudinal survey of students and their use of technologies in two Australian universities. The SEET survey is unique in Australia because it includes not just current use, but students' expectations about their future use of technology. The survey was originally run in 2010 and then repeated, with slight modifications to reflect changes in technologies, in 2013. This paper compares the results from 2013 with the 2010 results. Whilst some changes reflect the wider access to freely available open resources and new technologies such as Smartphones and iPads, other results are remarkably consistent with the 2010 results. Overall students are increasingly satisfied with their use of technologies and despite the increase in uptake of freely available technologies, it is evident that the LMS and its inbuilt tools and functions remain a key platform for learning and teaching at universities.

Keywords: SEET, learning technologies, student experience, LMS

Introduction

In 2010, three metropolitan Australian universities developed the Student Experience and Expectation of Technology (SEET) survey to gain a better understanding of students' experiences and expectations of the use of technologies for learning at university. The primary focus of the survey was to provide an evidence-base to inform planning for learning technologies, campus infrastructure, services and support.

Students were surveyed about their use of the LMS and 25 other technologies, ranging from established university offerings (email, learning management systems) to freely available social networking technologies (YouTube, Facebook), to identify:

1. technologies currently used for work and social purposes
2. technologies currently used for study purposes
3. technologies that students would like to use more for learning in the future
4. satisfaction with technologies, services and facilities

Since 2010 technologies have continued to evolve and there have been several major developments in the mix of technologies used at university and the way they are used by society at large. Many journal articles report on the use of a specific technology, such as blogs, wikis, twitter, but there is a paucity of information about the overall trends in the way technology is being used for learning and teaching. Australian statistics show that in the past 3 years, internet capability and increased access to broadband in the general community has increased, as has the ownership of Smartphones; between 2010 and 2011 there was an 18% increase in mobile handset subscribers across (ABS Year Book Australia, 2012). A question of interest to universities is whether these advances have led to students wanting to use their own technology for learning (Johnson, Adams, & Cummins, 2012).

When the Survey was implemented in 2010, iPads had just been introduced in Australia. By 2013, not only were tablet devices part of the technology landscape, there was a burgeoning industry in mobile apps, many of which were being used to support learning and teaching. Open content had become more freely available and was transparent and easy to access. This raised questions about the extent to which students were making use of these resources which are typically available from YouTube, Khan Academy and Massive Open Online Courses (MOOCs). More locally at the participating universities, upgrades to the university learning management

systems since 2010 had delivered enhanced capability in the form of additional Web 2.0 features (blogs, wikis, RSS feeds, Twitter feeds), more collaborative tools and efficiency tools such as assignment submission and Turnitin. There were questions of whether these advances would change the ways students interact, present ideas and information as forecast in the NMC Technology Outlook for Higher Education (Johnson, Adams Becker, Cummins, Freeman, Ifenthaler, & Vardaxis, 2013). Indeed, the 2014 Horizon report on Australian Tertiary Education (Johnson, Adams Becker, Cummins, & Estrada, 2014) states that ‘Bring your own device, Flipped Classroom, Learning Analytics, and Massive Open Online Courses’ are already making an impact and are rapidly becoming part of mainstream use in Australia.

To gain an understanding of the impact of the changing technology landscape, two of the original universities and a third metropolitan university decided to re-run the SEET Survey in 2013 (SEET II) to ascertain the degree of shift in the experiences and expectations of technologies at university since 2010. This paper reports on trends that have taken place in the uptake of technologies for learning purposes; what has changed and what has remained the same. Issues that have arisen in relation to institution-wide integration of technologies into learning and teaching will be discussed.

The SEET Survey

As noted above, the Student Experience and Expectation of Technology (SEET) survey was first developed in 2010 as a collaborative project between three universities. In designing the survey, the development team drew on overseas surveys (the JISC surveys in the UK, and the Educause surveys in the US), as well as Australian surveys on the first year experience (Kennedy et al, 2008). The SEET survey was unique in that it asked about the use of technologies in students’ everyday lives as well as for learning purposes at university. In addition, to focus participants on the affordances of the technologies for learning, it linked the technologies to specific learning and teaching processes. Students were asked about their access and use of technologies for learning, administration, communication and social and work purposes. The survey also asked four open-ended questions which provided qualitative data about the student experience. The results of this survey are documented in two papers (Gosper, Malfroy & McKenzie, 2013; Russell, Malfroy, Gosper & McKenzie, 2014).

The 2013 survey

Revisions for SEET II were undertaken by a committee from the participating universities. Relevant research including the NMC Horizon reports (<http://www.nmc.org/horizon-project>) was reviewed and collective input from colleagues at contributing and other universities was sought to ensure that the most recent technologies were included. Survey modifications were kept to a minimum to enable comparison of trends. The major changes to the technologies under review were:

- The term Social networking sites (e.g. Facebook, Twitter MySpace) used in 2010 has been separated into three separate technologies Facebook, Twitter and Other social networking (Tumblr, LinkedIn, Scoopit).
- New technologies added were Productivity apps on mobile devices (eg iAnnotate PDF, GoodReader, DropBox, Notes, Evernote), Discipline specific apps (Anatomy, Statistics, games) and Wikipedia.
- Functions added to the LMS were Turnitin, blogs, wikis and group areas for collaboration.
- MOOCs and Freely available educational resources (eg., TedX, Khan Academy, iTunes, YouTube) were added to reflect the move towards open access learning
- A new question on message boards / online systems that provide feedback about progress was added to reflect the increasing interest in learning analytics across the sector.
- Tablets (e.g. iPad, Samsung Galaxy or similar) and eBook readers (e.g. Kindle, Nook) have been added to the list of computing equipment students use to access coursework. In addition to asking participants which equipment they have access to, they were also asked to identify which equipment they used and would prefer to use most often for their course.

Overall, 23 types of software were included in the survey - internet search engines (e.g. Google, Google Scholar, Yahoo), email, text message (SMS), Facebook, photo /video sharing on the web (e.g. Instagram, Flickr, Picasa, You Tube, Vimeo), instant messaging (e.g. Skype, Yahoo Chat, ICQ), library search engines (eg e-journals/electronic databases), wikis (e.g. Wikipedia), freely available educational resources (e.g. TedX, Khan Academy, iTunes U, YouTube), Google docs or Google drive, other social networking sites (e.g. LinkedIn, Tumblr, Pinterest, Scoopit), data analysis software (e.g. spreadsheets and databases), collaborative/conferencing technologies (e.g. Skype, Facetime, Adobe Connect, Collaborate), presentation software (e.g. PowerPoint, Keynote, Prezi), Twitter, blogs, RSS feeds using a variety of web sources, online multi-user computer games

(e.g. World of Warcraft, Everquest), software to create audio/video materials (e.g. Audacity, GarageBand, Director, iMovie), ePortfolios (e.g. a webspace that supports your social, educational, professional activities), social bookmarking/tagging (e.g. Delicious, Diigo), virtual worlds (e.g. Second Life, OpenSim, Active Worlds) and MOOCs.

The survey (available at http://www.mq.edu.au/lrc/altc/student_it_experience) was comprised of 127 scaled response and four open-ended questions which covered access and use of computing equipment (e.g., laptops, campus computers, work computers, mobile technologies), technologies used in everyday life for social and work purposes, technologies used for learning and communicating with the university, satisfaction with services and support provided by the university and demographic profiles. A five point likert scale was used to measure uptake as defined by Never/Rarely, A few times a semester, A few times a month, A few times a week, One or more times a day.

Procedure

The Survey was implemented at the three universities in October 2013 and delivered by Voice Project, (Macquarie Park - <http://www.voiceproject.com/>). At one university, 75% of students were identified using selective sampling and invited to complete the Survey; at the other two universities, all students were invited to participate. Invitations to participate were emailed to students and extensive advertising was undertaken through the campus communications channels at each university. A Mini iPad and iTunes vouchers were offered as incentives to complete the survey. Ethics approval was sought and granted by the lead University's Human Ethics Committee.

This paper is confined to a report on the trends in uptake of technologies from 2010 to 2013. To increase reliability of findings we have used data from the two universities that participated in both surveys; they also had similar sample sizes. To gauge the significance of changes taking place, we have estimated margins of error for each score, using a 95% confidence interval. Given that the results are based on a sample of students, the margin of error indicates the likely range in which lies the true score for the full population of students. Differences in scores that we have reported as statistically significant have exceeded the margin of error. Because of the large combined sample size, a shift of two and in some cases one percent was significant, hence when interpreting the findings it is recommended that this is done through a lens of practical significance in relation to the size of the change and its implications for learning and teaching, rather than strict adherence to measures of statistical significance. A thematic analysis was conducted on the open-ended questions. To ensure reliability of coding, the coding system was devised by the researchers, each then independently coded questions for their university and then met as a group to discuss anomalies and cross-check a sample from each university.

Participants

In 2013, there was a combined dataset of 2,276 students from the two universities, compared with 2,849 in 2010. Although approximately one third of participants in both years did not provide demographic details, the demographic profile remained relatively consistent between 2010 and 2013 – as shown in Table 1.

Table 1: Comparison of demographic profile from 2010 to 2013

	2010 n=2849	2013 n=2276		2010 n=2849	2013 n=2276
Male	33.4%	33%			
Female	45%	42.6%	Architecture & building	1.6%	1.4%
			Arts, Hum, Social Science	13.3%	11.6%
International	13.25	15.9%	Design, Creative, Perform. Arts	1.6%	1.5%
Local	65%	59.7%	Psychology	2.1%	2.7%
			Law	8.3%	5.8%
25 and under	54.5%	53.7%	Computer Science	5.7%	5.9%
26 – 40	16.5%	18.8%	Economics	.06%	.06%
Over 40	7.5%	4.0%	Business & Commerce	20.5%	18.4%
			Education	5.5%	6.2%
Full-time	60.5%	59.9%	Engineering and Surveying	7.3%	7.0%
Part-time	17.7%	16.0%	Health & Medicine	4.6%	6.5%
			Life Sciences	4.1%	4.5%

Bachelor	57.0%	55.1%	Physical Sciences	2.3%	4.2%
P-Grad	21.4%	20.7%			

Results

Access to computing equipment

Since 2010 there has been an overall increase in students' access to computing equipment. Students with access to a laptop or desktop computer at home has increased from 87.3% of participants in 2010 to 96% in 2013; access to a university provided computer has increased from 64% to 69% of participants. The most significant change has been increased access to mobile technologies. Whereas in 2010 only 53.6% had access to a smartphone, this has increased to 82% in 2013. In addition 46% of participants have access to a tablet (e.g. Apple iPad, Samsung Galaxy or similar).

These same access trends are reflected in the technologies students use for coursework (Table 1). By far the most popular location is from home which has remained relatively consistent from 2010 to 2013 at 96 % and 98% respectively. There has been a significant increase in the use of mobile technologies from 34% in 2010 to 58% in 2013. A direct comparison of on-campus use was not possible because of a change in wording of the questions, with on campus spaces being separated in 2013 into dedicated computer labs and library, or other spaces. This reflected the trend towards wireless-enabled informal learning spaces, which in 2013 were used more often than formal labs. The change in use of computers at work was not significant.

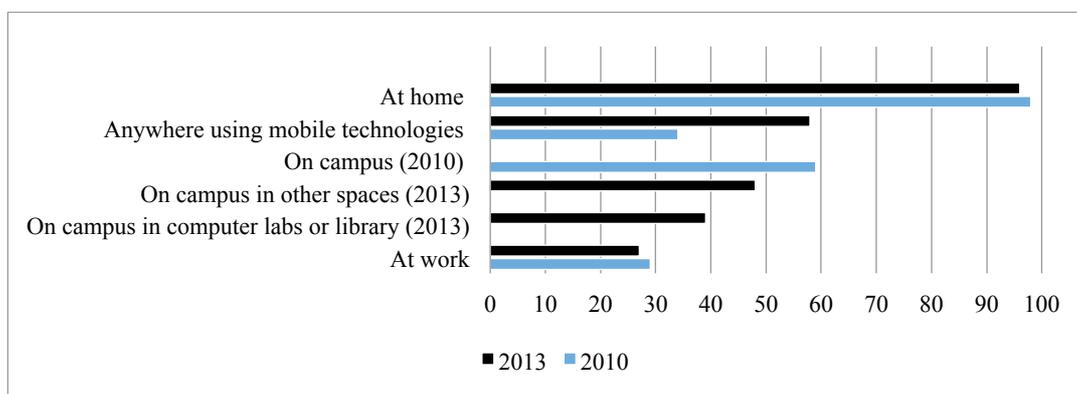


Figure 1: Percentage of participants studying from designated location 1-2 times/day to a few times/week

Technologies used for learning

The technologies, other than the LMS, that have been used as part of students' coursework are listed in Figure 2.

Significant shifts of more than 3 percentage points have been in the use of:

- web-based document tools (e.g. Google docs/drive, Dropbox) to work collaboratively on activities and assignments, which increased by 13%
- library tools to find online resources (e.g. catalogues and electronic databases) which decreased by 8%
- webconferencing or video chat (e.g. Skype, Face Time, Adobe Connect, Collaborate, Google Hangouts) to communicate and collaborate with other students on assignments and projects, which increased by 4%

Technologies and uses that had a small but significant increase in uptake of around 2-3 percent were:

- internet search engines to find online resources (e.g. Google, Google Scholar, Yahoo)
- RSS feeds to subscribe to information sources that are relevant to studies
- Creating audio /video materials to share other students online (podcasts/vodcasts)
- web services to share resources and ideas related to your course and learning (e.g. FLICKR, YouTube, Picassa)
- creating wikis collaboratively with other students as part of your studies
- an ePortfolio to record or reflect on your learning as part of your studies

- an ePortfolio as a record of learning and experiences for professional or employment purposes outside of University
- webconferencing or video chat (e.g. Skype, FaceTime, Adobe Connect Collaborate, Google Hangouts) to join in remotely to live lectures and tutorials
- creating websites as part of your course (e.g. using WordPress, Google Sites)
- interactive whiteboards to participate in tutorial-based learning activities

Technologies and uses where there was *no significant change in the rate of uptake* were:

- watching or listening to podcasts or vodcasts created by lecturers
- developing a blog privately to develop your own ideas or to reflect on your learning
- using social bookmarking sites (e.g. Delicious, Diigo) to bookmark useful web links and share them with other students
- using software that is specific to your field of study (e.g. Mathematica, AutoCAD, statistics packages, games)

The new technologies that have been added since 2010 (denoted by an * in Figure 2) have largely proven to be popular:

- the use of Wikipedia to find information is used at least a few times a week by 52% of participants
- the use of Facebook for groupwork is used at least a few times a week by 36% of participants
- productivity apps on mobile devices (e.g. Notes, GoogleReader, DropBox, Evernote, Annotate PDF) are used at least a few times a week by 24% of participants.
- freely available educational resources related to your field of study (e.g. TedX, Khan Academy, iTunesU, YouTube) are used at least a few times a week by 14% of participants.
- social networking sites (other than Facebook -Tumblr, LinkedIn, Pinterest, Instagram, Scoopit) for groupwork activities are used at least a few times a week by 11% of participants.

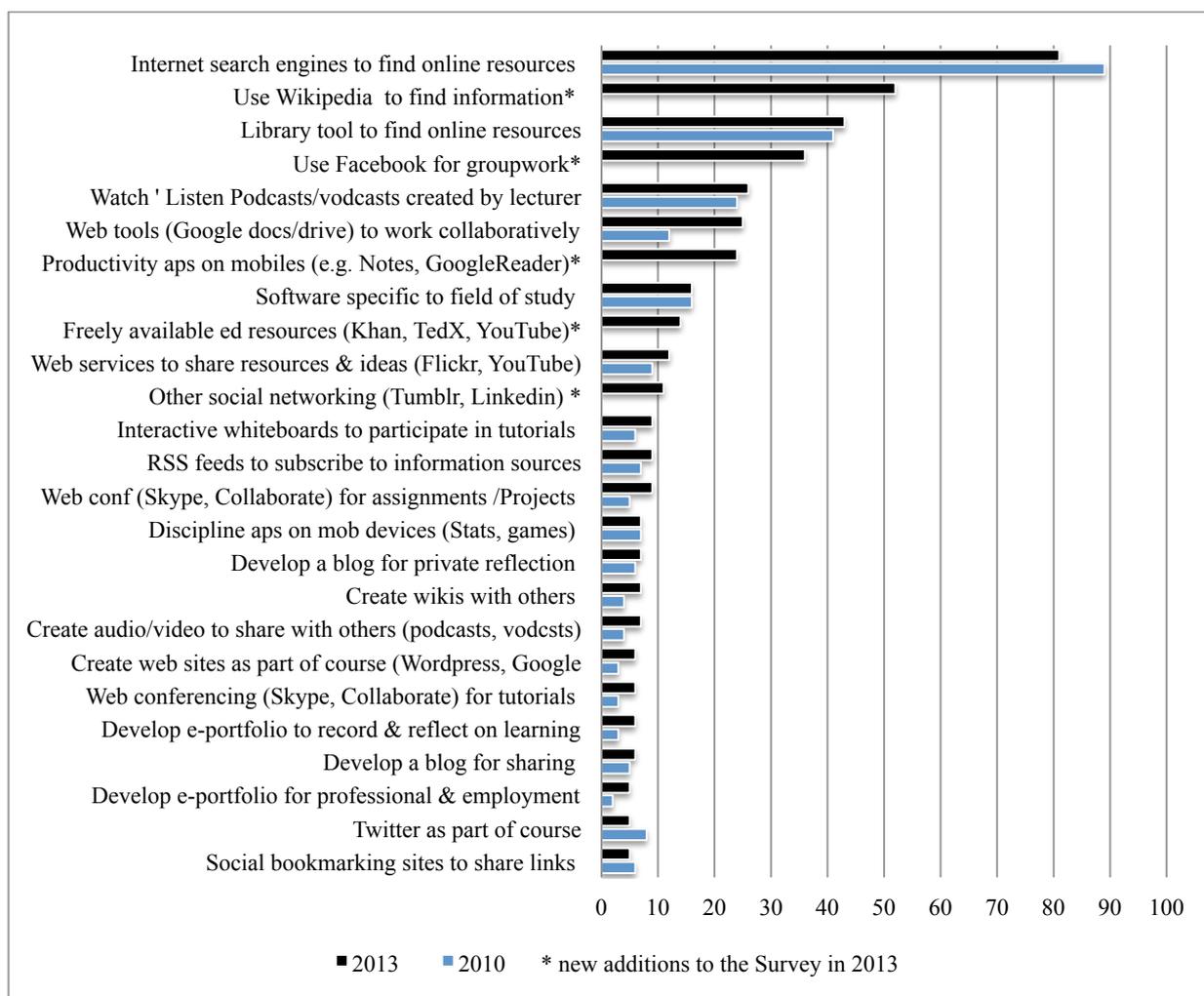


Figure 2: Technologies used for coursework purposes 1-2 times/day to a few times/week

Although MOOCs have attracted a lot of interest in the popular press and in Universities, there is very little awareness within the student body. Only 2% of participants have completed one or more, 5 % have started but not completed one, 16% have heard of them and 77% had not heard of them at all.

The learning management system

In 2010, both universities were using Blackboard as their LMS. Between the 2010 and 2013 surveys, Blackboard has been replaced by Moodle at one university and upgraded at the other. In both new systems, many of the functions are similar although in the Moodle installation, there are additional or enhanced features such as Web 2.0 style collaborative tools (wiki, blogs, feeds and Twitter feeds) and Turnitin, which were already available at the other university. Seventeen core functions of the LMS were identified for exploration. Responses in Figure 3 show a comparison between 2010 and 2013 of use of these functions at least a few times a week; the new functions that have been added since 2010 are denoted by an asterix.

All functions, except Discussion forums recorded a significant increase in use. The new technologies however had a relatively low uptake with the most popular being:

- Turnitin for checking assignments pre-submission - used by 17% of participants
- Group areas for working collaboratively – used by 18% of participants

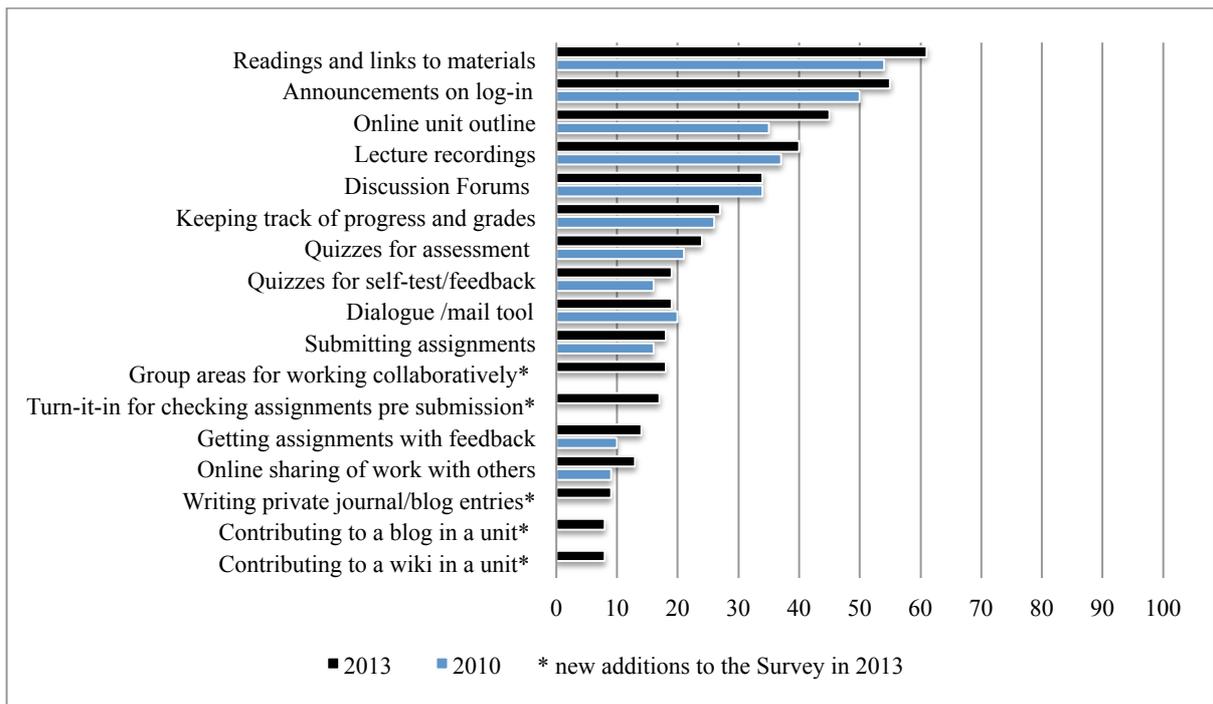


Figure 3: LMS functions used by students 1-2 times/day to a few times/week

Most popular technologies for coursework purposes

Overall, the most popular learning tools drawn from all technologies (including the functions in the LMS and those outside the LMS) are shown in Table 2. If the new technologies added to the survey in 2013 are discounted, the technologies and their order of use remained relatively stable from 2010 and 2013, with those providing access to content and information being the most popular.

As well as indicating how often they used particular technologies, participants were asked to indicate how often they would like to use the technologies in the future. It is notable that the preferred technologies reflect those that are currently in use (Table 2), with the addition of LMS quizzes for self-test/feedback and LMS group areas for working collaboratively. Compared to current use, participants would like increased use of almost all technologies with the exceptions being: internet search engines for which the use remains the same and Wikipedia for which there is a drop in desired use by 8%.

Table 2. The most popular technologies used for coursework activities, at least a few times a week

Most popular technologies in 2013	%	Most popular technologies in 2010	%
1. Internet search engines to find online resources	81	1. Internet search engines to find online resources	89
2. LMS: Readings and links to materials	61	2. LMS: Readings and links to materials	54
3. LMS: Announcements on log-in	55	3. LMS: Announcements on log-in	50
4. Use Wikipedia to find information*	52	4. Library tool to find online resources	41
5. LMS: Online unit outline	45	5. LMS: Lecture recordings	37
6. Library tool to find online resources	43	6. LMS: Online unit outline	35
7. LMS: Lecture recordings	40	7. LMS: Discussion Forums	34
8. Use Facebook for groupwork*	36	8. LMS: Keeping track of progress & grades	26
9. LMS: Discussion Forums	34	9. Watch /Listen Podcasts/vodcasts created by lecturer	24
10. LMS: Keeping track of progress and grades	27	10. LMS: Quizzes for assessment	21
11. Watch / Listen Podcasts/vodcasts created by lecturer	26	11. LMS: Dialogue /mail tool	20
12. Web tools (Google docs/drive) to work collaboratively	25	12. LMS: Submitting assignments	16
13. Productivity aps on mobiles (e.g. Notes, GoogleReader)*	24	13. Software specific to field of study	16
14. LMS: Quizzes for assessment	24	14. LMS: Getting assignments with feedback	10

*New additions to the Survey in 2013

Communicating with staff and other students

Overall, there has been a significant increase in the use of technologies for communicating with staff, with the exception of communication tools in the LMS, which recorded no significant change (Figure 4). The most popular means of communication remains email, which was used by 35% of participants at least a few times a week, followed by LMS tools 31%, and face-to-face meetings 24%. The most significant changes have been an increase from 30% to 35% in the use of email, an increase from 14% to 18% in the use of phone calls, and an increase from 6% to 10% in the use of collaborative conferencing tools. Facebook, which was not surveyed in 2010, is now used by 17% of students to communicate with staff.

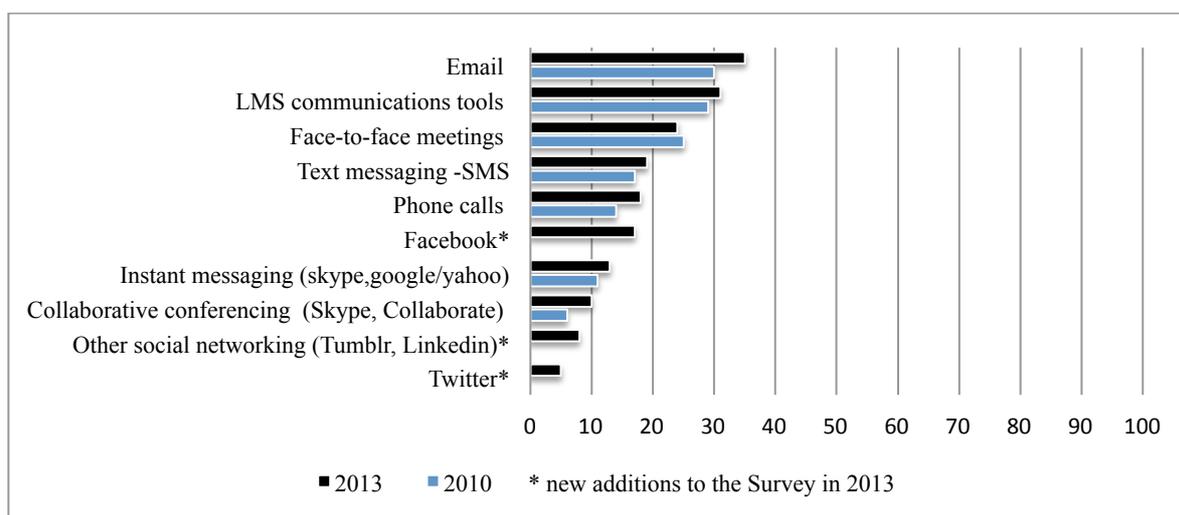


Figure 4: Technologies used to communicate with staff a few times a week to 1-2 times a day

The pattern of communication amongst students (Figure 5) reveals more variation than staff-student communication. Three clear groupings have emerged. In the top group, text messaging, face-to-face meetings and email all remain popular however there has been a significant decreases of 7% in the use of email and 4% in face-to-face meetings. Facebook which is used by 42% of participants to communicate has emerged in second place. In the second group, there has been no significant change in the use of instant messaging, phone calls or tools in the LMS, all being used by close to a quarter of participants. In the third group, little use is being made

of Other social networking and Twitter however there has been a significant increase in those using collaborative conferencing even though it only attracts 11% of participants.

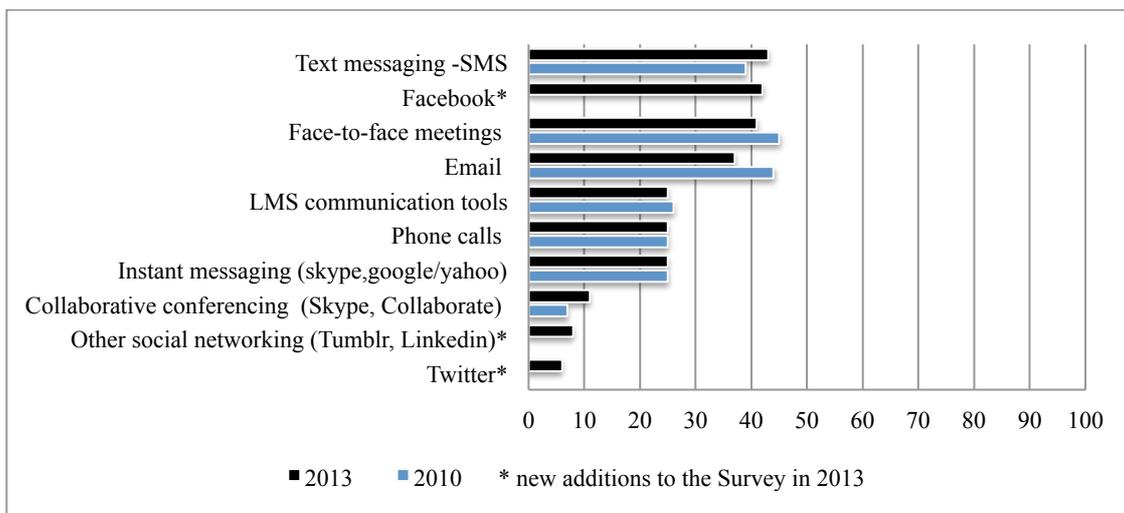


Figure 5: Technologies used to communicate with other students a few times a week to 1-2 times a day

Overall satisfaction with the use of technologies

Overall, students' satisfaction with the use of technologies for learning has increased since 2010. Even so, as noted by Ingerman & Yang, (2011), demand will inevitably exceed availability. This was evident in the open-comments where there were numerous requests for increased access to campus computers, more reliable wifi coverage, powerpoints for charging mobile devices and access to printing facilities, even though both universities had expanded their infrastructure considerably since 2010.

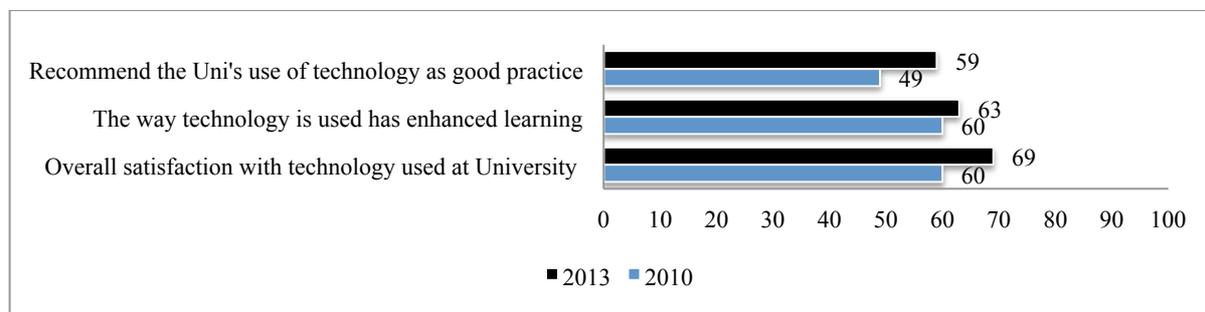


Figure 6: Overall satisfaction with the use of technologies

Discussion and conclusion

The SEET survey aims to provide longitudinal data on the experiences and expectations of students in their use of information and communication technologies at university. This paper focusses on a comparison of the uptake of technologies between 2010 and 2013 for coursework purposes, communicating with staff and collaborating with fellow students. Although not reported in-depth in this paper, qualitative comments suggest that there are individual differences in experiences and expectations. Likewise, there are differences across different cohorts relating to for example, age, enrolment mode and mode of study. These differences will be reported elsewhere, with only the broad trends being reported here.

Overall, since 2010 there has been an increase in the use of most technologies for learning. The most popular technologies as listed in Table 2, remain consistent with 2010 trends (Gosper et al., 2013). The highest level of use is for access to content and information via search engines, library tools, links to readings and materials, announcements through the LMS, the unit outline, lecture recordings and podcasts. Technologies that support communication, interaction and collaboration continue to be in demand with greater use being made of

Facebook, discussion forums, web tools such as Google docs/ drive, productivity apps and LMS tools for keeping track of grades and progress.

A number of these popular technologies, particularly those in the LMS, are used at the discretion of academic staff and are integral to the design of learning experiences, so it would be expected that they would be amongst those with the highest uptake. Of interest however, is the number of popular technologies that students use at their own volition. These include Internet search engines, Wikipedia, Facebook, Web tools (Google docs/drive) and productivity apps on mobile devices. Students are now making more use of these freely available technologies than in 2010. At that time, four of the 14 most popular technologies came from outside the LMS and in 2013 this has risen to seven. Despite the increase in use of these other technologies, it is evident that the LMS and its inbuilt tools and functions remain a key platform for learning and teaching at Universities. Further, nine of the 17 technologies that over a third of participants would like to make more use of in the future were from the LMS. Although there has been speculation about the relevance of the LMS to modern education (Scalter, 2008, Weller, 2010), the findings clearly show that it remains popular and students expect that it will remain.

Desktop or laptop computers accessed from home remained the most available and frequently used equipment for learning. Significantly in 2013 there was an increased uptake of mobile technologies (Figure 1); a trend that has been foreshadowed in recent technology forecasts (Johnson, Adams Becker, Cummins & Estrada, 2014). Ownership of smartphones is high, running at 82% however this access varies by age, with the 30 and under age groups having more access than those above 30. Smartphones are used by 36% for coursework purposes but only 19% would prefer to use them in the future. In contrast, ownership of tablets (Apple ipads, Samsung Galaxy and similar devices) is at 46%, with 26% using them for coursework and 38% wanting to make more use of them in the future. While smartphone are more popular than tablets for learning purposes, in the future there is a clear preference for tablets.

The increasing uptake of mobile devices can be linked to their availability and also to students need for connectedness, efficiency and flexibility to balance the competing demands of work, life and study (James, Krause & Jennings, 2011). Their rise in use (Table 2) and continuing demand for web tools (Google docs and Google drive to support collaboration), web conferencing and chat tools (e.g. Skype and FaceTime) and productivity apps (e.g. Notes, GoodReader) reflect the affordances offered by these technologies. Uptake is likely to increase into the foreseeable future (Johnson et al., 2014) as the technologies improve and more apps become available to support learning.

Social networking technologies now have a stronger presence as an educational tool although there are widely different views of their usefulness held by participants and also expressed in the literature (Madge, Meek, Wellens & Hooley, 2009; Jones, Blackey, Fitzgibbon & Chew, 2010). Nevertheless, with 36% of students using Facebook at least a few times a week and 43% wanting to make more use of it in the future, it is becoming an established technology for learning. Facebook is also used regularly by 42% of students to communicate with each other but to a far lesser extent for communicating with staff. Other social media, for example, social networking applications (Tumblr, LinkedIn, Pinterest), Twitter, social bookmarking and tagging and RSS feeds have made very few inroads into the educational domain. The success of Facebook in comparison to other social media technologies may be due, in part, to its high rate of use in everyday life where it is used regularly by 80% of participants. Other applications have far less penetration with typical uptake of between 5% and 11% of participants. If students are not using these technologies in everyday life and staff are not modelling their use by effectively integrating them into the curriculum, then it is highly unlikely that students will perceive the affordance they may bring to the educational context (Tay & Allen, 2011). Overall, the use of social media for learning is at best patchy, and even though Facebook has a stronger presence, the open ended comments indicated that it is still disliked by many for study purposes. The use by students is at their own volition and it is still questionable whether students would be accepting of staff using it as a requirement of coursework.

Access to content remains consistently high in demand with particular interest in digitised, multimedia resources specifically lecturer-generated materials (podcasts, vodcasts and online lectures). New to this survey have been questions reflecting the emergence of open education resources (Carey & Hanley, 2008) and we are seeing a strong interest in these for example, Wikipedia, TedX, Khan Academy, iTunesU and YouTube. These resources currently have varying levels of uptake, but all have been identified by participants as areas for future growth. The conundrum surrounding these resources and the mobile technologies and applications discussed above is that students have the wherewithal to use them now, so what is preventing their uptake? Is there a lack of awareness of what the technologies can do? Is there the perception of a need to gain permission for their use in coursework? Or are students waiting for staff have to model their use and provide guidelines for practice?

The second iteration of the SEET survey has given a snapshot of trends in students' experiences and expectations of technologies over time, providing evidence of the 'lived experience' of students and dispelling beliefs of what students want, often based upon supposition or anecdotal evidence. The picture from 2010 to 2013 is one of an incremental rather than dramatic increase in students' uses of technologies for learning and in everyday life. The LMS remains popular and new technologies have mainly added to, rather than displaced the use of earlier technologies. The exceptions to this incremental change are tablets, Facebook for communicating and collaborating with fellow students, and web tools (google docs/drive) to support collaboration. The greatest change in learning for the 2013 cohort of students can be attributed to mobile technologies and associated cloud-based services and apps. Although freely available educational resources (e.g. from Khan Academy, TedX, YouTube, iTunesU) are becoming of interest, there is very little awareness of, or interest in MOOCs.

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