

## Learning with technology: what do students want?

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### Abstract

This paper presents the results of a study into which technologies are preferred by students to support their studies. The study has taken place across four universities in the North of England. Much has been written and discussed about the differences between generations regarding their acceptance and ease of use of technology. Terms such as 'Digital Natives' (Prensky, 2001) or 'Net Generation' (Tapscott, 1999) are frequently used to portray the younger generations born after 1980, who regard digital technology as routine, essential and unexciting. However, many authors have also argued against this rather simplistic classification. Independent of whether Digital Natives exist or not, it cannot be denied that mobile and internet-based technologies have proved valuable tools that enable students to access learning at a time that suits them, at their own pace, and wherever they prefer.

As part of a HEFCE funded project, the Centre for Excellence in Teaching and Learning - Active Learning in Computing (CETL ALiC) - has conducted ten surveys over four years and across four institutions to identify the needs and preferences of our undergraduate students. CETL ALiC is a collaborative project between four universities in the North of England: Durham, Newcastle, Leeds and Leeds Metropolitan, allowing the opportunity to conduct a comparative study across all four institutions and share findings of studies conducted at individual institutions.

The comparative study in the form of a survey about preferences in information and communication technologies was distributed to all first year students soon after their arrival at the four institutions. Findings indicate that the majority of these students arrive with technologies that allow them constant access to internet technologies while at their university accommodation and to internet-ready mobile devices capable of playing audio or video files that they carry with them on an daily basis, providing them with a range of options in how they might access learning materials. The spread of personal technologies brought by students on entering university has grown year on year.

We also specifically investigated student attitudes towards podcasting, i.e. the use of audio and video files to support flexible teaching and learning, which can be automatically downloaded to mobile players via subscription; and to attitudes towards universities communicating with them through social networking sites. Our findings indicate that while students value the choice available to them, the majority still prefer to access and conduct their learning in traditional ways using computers, pen and paper, as well as personal contact

time with their tutor and many are sceptical about what is viewed as university intrusion into their social spaces.

## 1 Background

Every university must plan ahead for their prospective students in terms of the materials, staffing, equipment and facilities required and, most importantly, maintain currency, in terms of providing a learning environment and programmes relevant to the changing needs of students, disciplines and of society in general. In order to provide this currency and relevance we need to design and deliver programmes that recognise the learning needs of the audience we are seeking to attract. It is also imperative that our programmes enable the development of graduates with the requisite skills to meet the needs of their future employers and that we offer challenging learning and teaching approaches that reflect the growing ubiquity of computer technology within every aspect of business and social life. In parallel with these requirements, ALiC's particular aims are to engage students more with the Computing Science curriculum, to assist them in becoming more employable by developing a wider range of both technical and transferable skills and to harness technological developments to help create new teaching and learning approaches to fulfil these aims<sup>1</sup>.

Currently all four institutions still provide the 'standard' educational environment for Computer Science in terms of laboratories and teaching methods such as lectures, practical sessions and tutorials, and the use of desktop machines in laboratories. However, as part of the ALiC project, we have all adapted learning spaces to cater for group work and to encourage flexibility in terms of teaching style and task design. Our development of these spaces has shown us that students want to experiment with technology and find it exciting to work with novel and non-standard technologies (Cope et al., 2008). These developments have allowed us to take risks with our curriculum design and explore new approaches in order to test our assumptions about students' expectations of technology and their learning preferences (for example, Charlton et al., 2009; Devlin et al., 2009; Ford et al., 2009).

Creating these spaces and providing the non-standard equipment during the project has not been easy (examples of such equipment include tablet PCs, PDAs for software development, web-cams and iPods). We faced opposition from some colleagues who were uncomfortable with our approach. One argument against our initiatives was the fact that the number of such devices was available from the university was necessarily limited and therefore that the best was to ensure parity between students was to provide a standard set of computing equipment in a laboratory. There was concern as to whether we were relying on students' ownership of mobile devices in order to access the new content or ways of learning that we introduced. We recognised the validity of these concerns in terms of economic and organisational factors: most departments would not have the ability to support a diverse set of personal student-systems, that mobile devices introduce the need for added security and insurance, and that we need to always ensure accessibility and equality of provision for all students.

With these issues in mind, we have conducted an annual survey of first year students, extending the scope of the survey year on year, to help inform how we can best reshape our current approaches to teaching and learning to take account of the availability of technologies to, and the preferences of, our students. We asked ourselves four key questions.

1. What can we assume about the access students have to personal and internet-enabled technologies?
2. How far are students willing to allow universities to contact them via personal devices and social spaces?
3. Is there a demand from students to introduce use of mobile devices and social networking into the learning experience?
4. Is there an argument for mandating students' ownership of specific technologies given that students are studying the discipline of computing?

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<sup>1</sup> <http://www.dur.ac.uk/alic/overview/>

## **2 Data Collection Methods**

An annual survey was distributed to first year students either on-line or in paper based form in each academic year from 2006 to 2009. At the start of the academic year 2006/07, the first technology survey was distributed to computing students at Durham University only. The survey's aim was to obtain students' views on the newly installed Techno Café (Hatch and Burd, 2006) and enquired about the technology students brought with them to university. In subsequent years the survey was distributed to first year students studying computing at other partner universities (Newcastle in 2007; Newcastle, Leeds and Leeds Metropolitan University in 2008; all four universities in 2009) and no longer contained reference to the Durham Techno Café. The subsequent surveys were expanded to include more questions about students' access to technologies when first arriving at the university. The questions were aimed at identifying whether students newly arriving to study at university would have access to PCs, laptops and internet from their term time address. The students were also asked which communication technologies they used regularly and whether they would like to be contacted via those communication technologies by the university. The most recent survey, distributed in the academic year 2009/10, also included questions about the use of podcasting for teaching and learning.

## **3 Participation in the surveys**

The 2006 survey was a very short technology survey that was only distributed at the research project's lead site Durham University: 41 out of 60 students studying for computing degree responded to the survey. In the academic year 2007/08, a survey was distributed across two of the universities from the CETL ALiC consortium. The University of Durham distributed the survey to 70 computing students and Newcastle to 88 computing students: 59 and 88 students, respectively, responded to the survey.

In 2008/09, the survey was distributed to three of the universities from the CETL ALiC consortium: Newcastle, Leeds, and Leeds Metropolitan. Respondents were 125 full-time Newcastle University students enrolled on single honours Computing Science, Software Engineering, and Information Systems degrees. At the University of Leeds the survey was distributed to about 70 students studying Computing of which 15 responded. At Leeds Metropolitan University the survey was distributed via the virtual learning environment to two out of four schools within the faculty of Information and Technology: to the School of Computing (69 respondents) and the Music Technology school (83 respondents), which resulted in a total of 146 respondents out of 498 first year students.

In the most recent academic year 2009-10, the survey was published at all four universities. Three of the universities used the (same) online survey for distribution, the fourth university, Newcastle, handed out the same survey in paper format. Respondent numbers were as follows: Durham 29 (out of 43), Newcastle 108 (out of 124), Leeds 29 (out of 80 students), Leeds Metropolitan 38 (out of 448 students).

## **4 Results from the surveys**

We consider the results from the four years of the survey under four key areas: device ownership and internet access; use of social media; communication preferences; and use of podcasting. Note that the survey was developed each year to encompass new developments so some of these areas were only investigated in later academic years.

### **4.1 Device ownership and internet access**

The first survey in 2006 only covered the project's lead site Durham University. The majority of students had access to a personal computer or laptop at their term time address (61% owned a Desktop PC, 68% owned a laptop). Some students had access to more than one computer. However as can be seen a significant minority was still reliant on computers at the university.

In 2007 the scope and coverage of the survey widened and responses were sought at two of the four universities in the consortium, and questions extended to cover mobile device ownership and internet access. In this year the number of students at Durham with their own PC or laptop had increased to 100% of correspondents, with students at Newcastle still lagging behind with 64% ownership. In addition, 66% of the respondents studying at Durham had wireless internet access where they lived.

However, when it came to mobile devices, Newcastle students took the lead, with 99% of respondents at Newcastle regularly using mobile and digital communication technologies, against 88% of the respondents at Durham. There was a high ownership of portable devices, such as mobile phones and mp3 players, which the majority of students regularly carried with them: 98% of Durham's respondents and 99% of Newcastle's respondents always carried their mobile phone with them (though given the figures for regular use, some students clearly did not use them very much). Fewer students (though still a substantial number) carried MP3 players: 49% at Durham compared to 63% at Newcastle. Relatively few students owned video iPods: only 14% at Durham and 2% at Newcastle.

In 2008 the survey was distributed to students at three universities: Newcastle, Leeds and Leeds Metropolitan. As in previous years the majority of students either owned a laptop or desktop computer in their first few weeks at university, with the trend moving towards laptop rather than desktop ownership. In 2008, 53% of respondents from Newcastle owned a PC, while 91% owned a laptop. At Leeds University 14 out of the 15 respondents claimed that they owned either a PC or laptop. At Leeds Met, however, only 43% of students owned a PC, compared to 69% owning a laptop, a considerably lower proportion than at the other two institutions, which may be indicative of a more affluent student demographic.

However, once again there was high ownership of mobile phones with, for example, 98% of Newcastle's students and 95% Leeds Met's students owning and regularly carrying a mobile phone.

There was a significant difference between the universities in respondents carrying a music player at all times and a considerable increase for Newcastle from the previous year: 91% of Newcastle respondents, compared to only 38% at Leeds Metropolitan University. Also, while 16% of Newcastle's respondents regularly carried a PDA, only 3% of Leeds Met's respondents did. It is also worth noting that ownership of video iPods and similar devices increased substantially with about a quarter of the respondents at Newcastle University (28%) and at Leeds Metropolitan University (26%) claiming to always have such a device with them.

Levels of access to the internet at their term time address was higher than seen at Durham in the previous year: at Newcastle 91% of respondents had internet access at Leeds University 100%, while at Leeds Met the level was slightly lower at 88%.

By the following year's survey in 2009, however, 100% of respondents at all four universities had internet access where they lived during the academic year.

As in previous years, the majority of students across all four universities (98% on average) carried a mobile phone with them at all times. Many also carried a portable music player (Durham 80%, Newcastle 78%, Leeds 86%, and Leeds Met 89%). Compared to previous years the number of students always carrying a device on which they could watch videos had risen substantially (Durham 63%, Newcastle 67%, Leeds 62%, Leeds Met 55%) and access the internet was now also available to many students on the move (Durham 58%, Newcastle 67%, Leeds 55%, Leeds Met 61%). This probably reflects a growth in ownership of smart multi-functional phones amongst students; however, we did not ask for details of the devices owned so cannot verify this.

## **4.2 Use of social media**

As well as device ownership in the last three years of the survey we also asked about students' experience of social networking, social media sites and virtual communities.

In 2007 83% of Durham's and 91% of Newcastle's respondents regularly accessed social networking sites such as Facebook. Chat programs, such as instant messenger, also proved to be popular, with 81% of Durham's respondents and 92% of Newcastle's respondents claiming regular usage. Social media sites such as YouTube or Flickr, that facilitate sharing of images and video, were also used regularly by 64% of Durham's and 73% of Newcastle's respondents.

However, students did not regularly use virtual communities, such as Second Life, with only 5% of Durham's respondents and 9% of Newcastle's respondents visiting such communities on a regular basis.

These trends continued for the next two years (2008 and 2009) with similar proportions of students from all universities surveyed using social networking and media sites (see Figure 1). By 2009/10 the majority at all universities were regularly used social networking sites to communicate (Durham 82%, Newcastle 88%, Leeds 84%, Leeds Met 76%) as well as sites for sharing social media (Durham 86%, Newcastle, 100%, Leeds 83%, Leeds Met 88%).

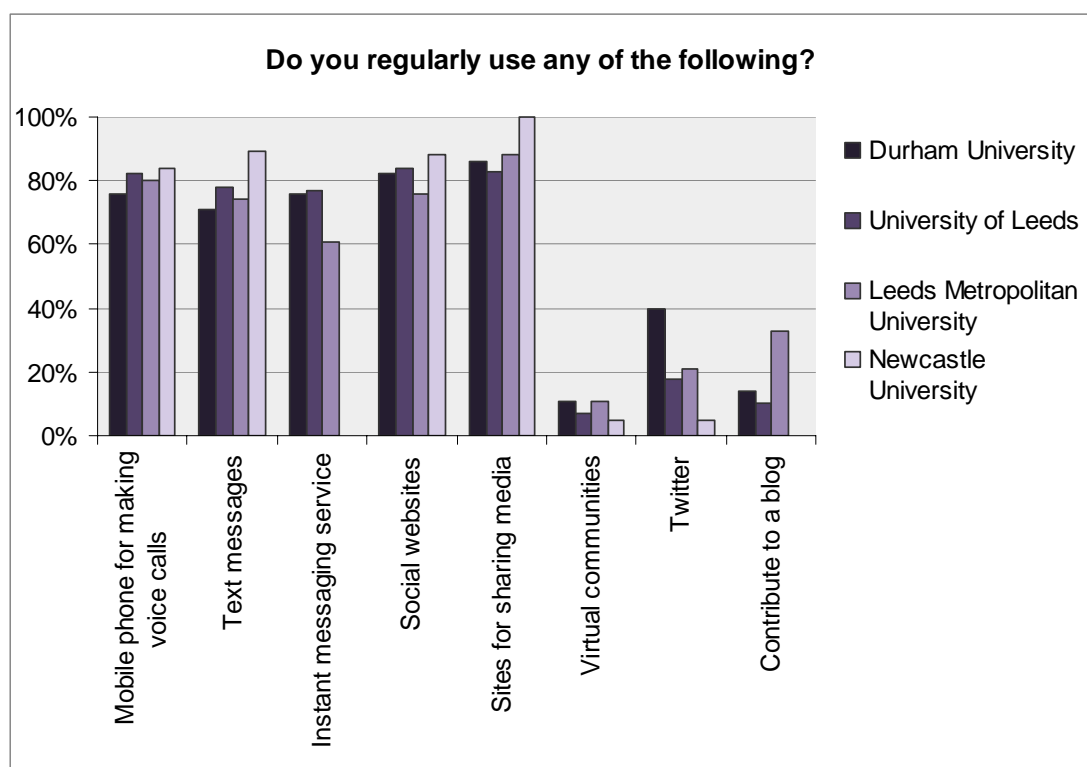


Figure 1: Usage of social media across universities in the academic year 2009/10

In terms of instant messaging in 2008, 77% percent of Newcastle's and 72% of Leeds Met's students regularly used online chat, compared to only 27% of Leeds University's students. Given that the numbers of respondents for Leeds was low, it is not possible to determine whether this is a genuine difference between student groups at different institutions or an anomaly with this particular set of students.

Use of virtual communities such as Second Life remained low in 2008 and 2009. On average across all three institutions in 2008, only 6% of respondents regularly used these online services, with a slight increase in 2009 (Durham 11%, Newcastle 5%, Leeds 7%, Leeds Met 11%) in some institutions. However the proportion overall is still very low.

In 2009, we also enquired about students' use of Twitter and Blogs. Our results show that the majority of respondents do not use these regularly. Use of Twitter is more likely at Durham with 40% of respondents claiming to use it regularly but least often at Newcastle with only 5% of the respondents claiming regular use. Contribution to blogs also varies with it more likely to

occur in Leeds Met where 33% of respondents claim regular engagement followed by Durham at 14% and Leeds at 10%.

### **4.3 Communication preferences**

From 2007 we asked students about their communication preferences, in particular whether they would be happy to be contacted by their university via mobile phone or social networking. Students consistently use mobile phones over landlines. In 2008 only 13% of Leeds University's respondents claimed to regularly use a landline, compared to 30% of students at Leeds Met, possibly because this institution has a higher proportion of local students who still live in their parental home. Students from all three universities regularly used mobile phones to make calls (on average 92% across the three universities) and send text messages (96% on average). In 2009, there was a similar pattern of use. A minority of respondents claimed to regularly use a landline to make phone calls (Leeds Met 23%, Durham 20%, Leeds 14%). Respondents preferred to make voice calls with their mobile phone (Durham 76%, Newcastle 84%, Leeds 82%, Leeds Met 80%). Respondents also regularly use text messaging to communicate (Durham 71%, Newcastle 89%, Leeds 78%, Leeds Met 74%).

It is not surprising that the students preferred to be contacted by the communication methods that they use regularly. In 2006 the majority of students indicated that their preferred contact method was via mobile phone text message (Durham 81%, Newcastle 84%), followed by calls to the mobile phone (75% Durham, 80% Newcastle). In 2008 66% of respondents at Newcastle claimed that they would be happy to use their mobile devices for learning and accessing online learning resources.

This is supported by an additional study at the University of Leeds, in logs of Virtual Learning Environment (VLE) usage were examined to establish when and how often students were using mobile devices to access information provided through the VLE (Boyle et al., 2008). These statistics show an increasing trend of access via mobile devices with the main mobile devices being classified as smart phones, even though neither layout or resolution of the VLE display was designed to be mobile device friendly.

However, while students were generally happy to use their mobile devices to support their studies, the picture regarding social networking sites was less clear cut. In 2006 less than half of Durham University's students (44%) wanted to be contacted by the university via social networking sites, compared to 72% at Newcastle. Students at both universities gave as the main reason for using social networking site to talk to friends (or make new friends) which may explain some reluctance to allow their social space to be used for university business. In 2008, the comparison across three universities showed that, again, respondents at Newcastle University expressed the strongest preference for contact through social networking (66%), compared to Leeds Met (45%) and Leeds University (40%). The reason for the consistently higher preference of using social networking sites as a contact method by Newcastle's students may be that the Computing department already uses Facebook for teaching and learning, for a collaborative project between computing students of the two universities (Charlton et. al, 2009), while this was not the case at the other universities.

The potential benefits and concerns of students regarding using social networking for learning was summed up by one Leeds University student as follows:

"The benefit of this would be users being notified quicker and more centrally since the likes of Facebook get checked very regularly. But they're much more for the social part of our lives rather than the academic. What happens in time outside the university that doesn't effect us academically doesn't need to be shared with university."

### **4.4 Use of podcasting**

In the final survey in 2009 we included questions about podcasting, including whether they had ever downloaded a podcast and whether they would wish to use their own mobile device to view learning and teaching podcasts. At each university, the majority of students had

downloaded podcasts at some point (see Figure 2, below). However, this was more often to their laptop or desktop computers (Durham 77%, Newcastle 78%, Leeds 66%, Leeds Met 80%) than to a portable music or video player (Durham 57%, Newcastle 22%, Leeds 28%, Leeds Met 46%). Reasons given for not downloading podcasts ranged from “Never really been interested” (Durham University student) to “Listen to them on the radio when they are on so don't need to download” (Leeds University student) and “Not interested in them. Don't own an MP3 player/iPod.” (Leeds Metropolitan student).

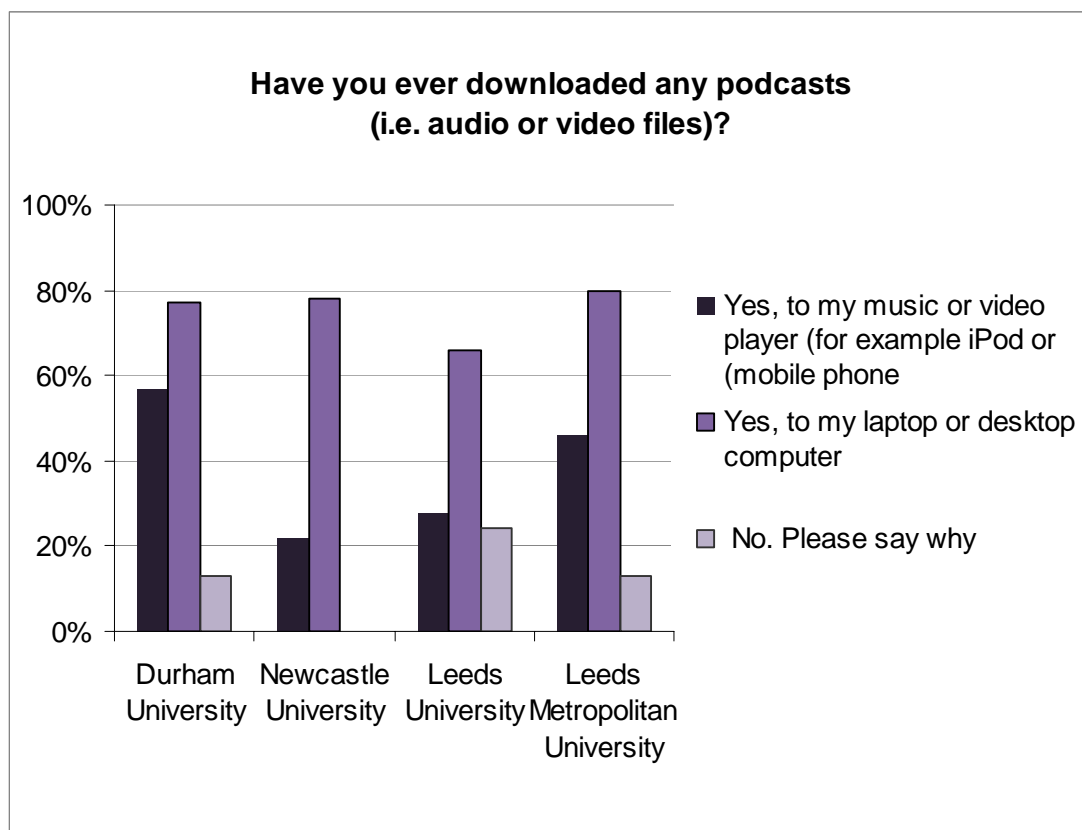


Figure 2: Download of podcasts across universities (2009/10)

However, only about half of the surveyed students would choose to use their mobile devices to access learning podcasts (Durham 50%, Newcastle 61%, Leeds 52%, Leeds Met 47%). Students who gave the response 'not sure', gave the following explanations, which correspond to findings from a podcasting study conducted at Leeds Metropolitan University (Gorra and Finlay, 2009): “I do not find audio/video content useful for learning. Text all the way” and “would rather get them on my PC. Can't see myself downloading and listening to podcasts when I am out and about.” (both comments from Durham University students).

## 5 Conclusions

We set out to answer the following questions about student use and preferences for the use of personal technologies and social networking in learning and teaching:

1. What can we assume about the access students have to personal and internet-enabled technologies?
2. How far are students willing to allow universities to contact them via personal devices and social spaces?
3. Is there a demand from students to introduce use of mobile devices and social networking into the learning experience?
4. Is there an argument for mandating students' ownership of specific technologies given that students are studying the discipline of computing?

We conclude by considering how far we have been able to answer these questions.

*What can we assume about the access students have to personal and internet enabled technologies?*

Throughout the four years of conducting this survey, the first year students studying computing at the four institutions arrived at the university with computers and/or laptops. The vast majority of students owned mobile phones and carried them with them at all times which may explain the students' choice of mobile phones being the preferred medium by which they would like to be contacted by the university. The majority of our respondents carry one or several mobile devices with functions ranging from making voice calls to listening to music.

Initially, particularly in the academic year 2008/09, there were some noticeable differences in device ownership between first year students of the four different institutions. For example, Newcastle University's students regularly carried more mobile devices and had a higher PC/laptop ownership, than for example those at Leeds Metropolitan University. This may have influenced the slightly lower usage of Leeds Metropolitan's students of communication technologies, such as social networking and sharing sites.

Analysis of the most recent survey data (2009/10) indicates that students across all four universities carry a host of mobile devices with functions ranging from making voice calls to listening to music. In contrast to previous years however, the number of students carrying devices that allow viewing of videos as well as internet access has increased, which is likely to be related to advances in technologies which make these more affordable. For example in the first quarter in 2009, smartphones, that is mobile phones with internet functions, made up a proportion of 16% of total mobile phone sales with smartphone unit sales being around 1.2million in the UK (Ofcom, 2009). Also interesting in this most recent data was also the fact that the device ownership and digital communication preferences was very similar across all four universities, indicating the increasing ubiquity of these technologies.

All of this helps to counter the concern that we are excluding students by making use of such devices. The majority of students will come to university with these technologies; it is incumbent on the institution to ensure that provision is made for the small minority who don't.

*How far are students willing to allow universities to contact them via personal devices and social spaces?*

Our results suggest that students are generally happy to be contacted via mobile devices. However, while the use of mobile devices extends to communication and access to learning materials, students are less interested in downloading video and audio files to their mobile devices, preferring to access these via their laptop or desktop machine.

Our students were less convinced by their university entering their social networking spaces, feeling that these were personal spaces. However, the consistently greater willingness of students at an institution where a social networking space had been used in teaching suggests that effective use of social spaces in learning might actually make students more amenable to this form of activity. It should be noted that the Newcastle students had access to a Facebook application that maintained a separation between the students personal friends and their peers on the course. This may have contributed to their favourable view of the use of Facebook.

*Is there demand from students to introduce use of mobile devices and social networking into the learning experience?*

While they value the choice available to them and are willing to use new technologies in their learning, many still prefer to access and conduct their learning in traditional ways, including using computers on campus as this provides students with a sense of 'community' (Boyle et al., 2008), and personal contact time with their tutor (Gorra and Finlay, 2009). Therefore, it is important to not make assumptions about the way that students want to learn but be flexible in our provision for these students in order to retain and engage students and attract more students to the Computing discipline.



The results from our studies, however, suggest that introducing new technologies into the student learning experience may encourage students to view these approaches more favourably. The onus is therefore on educators to identify appropriate uses of such technologies and introduce their use with sensitivity to students' preferences.

*Is there an argument for mandating students' ownership of specific technologies given that students are studying the discipline of computing?*

It is clear that while there are trends in student ownership and use of technologies, there is also significant variation in the devices that students choose. If we want to engage students then we need to find ways that harness technology that students use in their everyday lives but not encroach on their social space. This requires flexible approaches rather than mandating specific technologies. University policies need to promote flexibility for staff and students to allow for innovation and gradual change. We suggest an approach of 'pockets of innovation' rather than policy changes, in other words to develop initiatives on a local level and then feedback to the overall university system to encourage innovation.

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