Ubiquitous technology- does the e.learning environment match student expectations?

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Abstract
As an increasing number of universities globally, embrace e.learning technologies with their use of virtual and managed learning environments (VLEs and MLEs) the authors review student expectations about the use of technology in HEIs. The authors’ own institution was one of the first to adopt a university wide MLE in 2001, with on-line access to all staff and students via a personalised portal and it has embraced the use of technology to support a ‘blended learning’ approach to Higher Education.

The authors describe the process and the results from a major survey of new undergraduate and post graduate students at their UK University carried out since October 2005. They consider whether new students are now so familiar with technology to the point that it has become ‘ubiquitous’ and thus an inseparable part of their daily life, for study and leisure. Students were asked about the frequency of use of common technologies such as email, internet use and mobile phone texting. This was predictably high across all age groups. Their anticipation of regularly using appropriate technology in their studies was also high. However in contrast they largely stated a preference for a more traditional face to face approach within the teaching environment, in spite of the easy access to an on-line MLE.

The authors discuss the results of the survey and some of the questions which this apparent dichotomy raises for those who design and implement e.learning in the wider HE context.

Keywords: e.learning, ubiquitous technology, higher education, student expectation, blended learning

1. Introduction
The most recent cohort of new students entering Higher Education during September and October 2005 were some of the first to have experienced wide spread use of interactive whiteboards and other e.learning technology in their schools. In the UK there has been a growth in funding to support widespread take up of technology in secondary schools and other providers of post-16 education. Given this early introduction to the use of Information Communications Technology (ICT) through their compulsory education many students are now entering HE with an easy familiarity with technology which was quite unexpected just ten years ago. This upcoming generation has had many nicknames – the ‘Net generation’ from their familiarity with the internet and the ‘iPOD generation’ from one of the icons of modern technology, being just two of them. What both of these titles should alert us to is the apparent ubiquity of technology in students’ daily live; they are surrounded by technology inside and outside the classroom. This raises a number of questions for academics in higher education. What is the impact of the technology available in prior study and home environments on students’ attitudes to tertiary education and their expectations of living and studying in a university environment? Furthermore are we as academics too eager to apply this stereotype of a generation at ease with technology to all of the current intake of students? Could this lead to an alienation of those who are unfamiliar with ICT being left further behind their peers if there is a failure to provide the necessary technical and training support?

With these questions in mind the authors set out to investigate what were the student expectations of technology use and whether the existence of the university’s own mature managed learning environment had had an impact on their decision to apply for a place. The overall aims of the study were to identify students’ prior experiences of using technology for learning and leisure and their expectations of whether technology can enhance the learning experience.
2. Measuring Student Expectations and Experiences

2.1 Methodology
All newly enrolled students at the university have their own email account and access via the university’s managed learning environment (StudyNet) to a personalised portal. This portal provides access to each of the student’s modules as well as the university email system and a number of other resources such as programme and pathway news. There is easy access to leisure information via the students’ union support and students can use RSS and other tools to personalise their home page and access their own choice of news. The authors developed an online survey, administered through an external survey provider and a message was placed at the top level of the students’ portals inviting all new students to participate, with a prize draw to encourage them. The survey was made available online for 4 weeks to cover students arriving and settling down and to give them time to find their way onto the MLE. An email message was also sent to all first year students inviting them to participate. While any student could choose to participate via the on-line link, all those from other years were later removed by a comparison of the student ID numbers with enrolment information. Of an initial 815 who completed the survey, this was cleaned up to a participation number of 602, once duplicates and those from other years etc had been removed. Statistical analysis of the results followed and results are reported below.

2.2 Who are the student population and what technology do they currently use?

2.2.1. Age and gender spread
Figure 1 shows the age and gender spread of the participants in the online survey. 73.2% of the respondents (almost equally male and female) were aged between 18 and 21. This is very similar to the university’s overall profile of its new intake of students. The results show that for each age group there are no major differences in gender. For a few of the age groups there were differences, such as with the 18-21 group, where there are significantly more females (55.3%) than males (44.7%). The numbers of ‘mature’ students i.e. those over 22 on registration reflect the overall profile of the university’s intake.

![Figure 1 Age and gender of new students](image)

2.2.2. Activity prior to enrolling at university
To identify what proportion of students had entered university straight from studying, the authors investigated what they had been doing the year before they started studying. The majority of the largest age group (18-21) were studying last year (81.2%) rather than working (14.5%), family commitments, travelling or other (4.3%). This pattern seemed to be matched by the 22-25 age group. For the other age groups they were mixed in the activity that they were performing, but the modal...
activity was working. This would be expected since they are mature students so it is possible that they are returning to study part-time.

2.2.3. Access to technology prior to starting university

Students were asked to identify the technologies they had been using in the previous year and where they would access these from. They were presented with the following technologies: email, text messaging via mobile phones, internet for leisure and learning, and wikis, blogs and interactive whiteboards. The aim of this was to determine whether their use was confined to the more familiar technologies or whether they had been introduced to the more recent use of blogs, and wikis. Students responded on the frequency of their use of technologies.

When considering what the 18-21 age group were using in the previous year in terms of technology, the main activities taken part in on a daily basis were email (71.9%), text messaging (72%) and surfing the internet either for leisure (34.6%) or for learning (46.6%). Overall for all age groups, over 75% of the students were using email and 82% using text messaging from their mobile phone on a daily basis. The proportions for use on a minimum of a weekly basis were even higher.

To confirm the authors’ hypothesis that these students were indeed at ease using technology, when looking at the answers to the question ‘How much would you like to use technology in your studies?’ 90% overall answered in the columns for ‘very much’ and ‘moderate’. It would therefore appear clear that they are as a new cohort comfortable with using technology.

As far as weekly technology use in the last year there was no substantial difference between gender and technology use. The only difference worth reporting was of computer games which were used twice as many times more per week by males (21.9%) than by females (10.2%). The authors were surprised at the relatively low number of overall users of internet computer games, which seemed at odds with current perceptions that this is a very important leisure pursuit. Other than email, text messaging and surfing the internet, weekly uses of technology were generally less than 10%. This would imply that use of interactive whiteboards has not in fact been prominent for the current intake of students, nor have many of them used blogs or wikis.

2.2.4. Students’ perceptions of confidence in using technology

When asked about their confidence at using technology, levels overall were high with 74% being ‘very’ or ‘extremely confident’ about using technology in the context of studying and just under 3% who claimed to be not at all confident. Surprisingly of this 3% most (87.5%) were female and in the 18-21 age group. When reporting how confident they did feel, males aged 18-21 reported more than females in this age group that they felt ‘extremely confident’ (58% and 23%) whereas females reported they were ‘very confident’ compared to males (45.2% and 29.4%). This could highlight a minor difference in gender attitudes as it has been reported that males would normally rate themselves as being highly confident with using technology compared to females. Fewer older students both male and female (i.e.
those over 25) reported high levels of ‘extreme confidence’. This would suggest that the stereotype of older students reporting generally less confidence compared with younger students may be true. This result is of interest because nearly half of the older students reported that they would like to use technology during their course. Confidence and a willingness to use technology may not therefore be in complete alignment. When a Chi$^2$ was carried out it showed that there was a significant difference between age and confidence, and also gender and confidence which supports the above findings.

When asked if they wanted to use technology in their studies the older students generally expressed at least an equal desire to use technology in their courses as younger students. Figures are given on an age by age basis in Table 1. Those wanting to use technology ‘very much’ were 43.8% and those wanting to use it ‘moderately’ were 46.2%. As mentioned above together these add up to a total of 90% of incoming students across all faculties with a positive attitude to using technology in their learning.

<table>
<thead>
<tr>
<th>Age</th>
<th>Very much</th>
<th>Moderate</th>
<th>A little</th>
<th>None at all</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>18-21</td>
<td>177</td>
<td>31.9</td>
<td>190</td>
<td>34.3</td>
<td>37</td>
</tr>
<tr>
<td>22-25</td>
<td>37</td>
<td>6.7</td>
<td>29</td>
<td>5.2</td>
<td>3</td>
</tr>
<tr>
<td>26-29</td>
<td>8</td>
<td>1.4</td>
<td>8</td>
<td>1.4</td>
<td>3</td>
</tr>
<tr>
<td>30-39</td>
<td>10</td>
<td>1.8</td>
<td>17</td>
<td>3.1</td>
<td>3</td>
</tr>
<tr>
<td>40+</td>
<td>11</td>
<td>2.0</td>
<td>12</td>
<td>2.2</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
<td>43.8%</td>
<td>256</td>
<td>46.2%</td>
<td>47</td>
</tr>
</tbody>
</table>

Table 1 Percentages of students according to age wanting to use technology during their course

Physical access to technology has previously been suggested as a major barrier to its take up for students in higher education (e.g. *inter alia* Bowl, 2003) but this survey suggests that this may no longer be a major problem. Over 90% of new students claimed they were able to access technology from home, whether on or off campus, with just under 3% claiming they could not easily gain access to a computer. This figure rose to just 4.1% who claimed they could not easily access the internet. As these figures were achieved using an on-line survey then it is clear that these students did not have problems finding the technology to access the questions. A later study is now underway to try and capture the attitudes and perceptions of those students who prefer not to use technology at all.

How does this apparent ease with technology and generally high levels of confidence prepare students for their university learning experience? When asked how much they thought technology could enhance learning at University, only 2% reported ‘not much’ or ‘none at all’. For the 98% majority who chose either ‘very much’ or ‘somewhat’, it appears they feel technology can enhance learning and there is little difference between the genders when compared with the slightly higher number of female students overall. The options ‘very much’ and ‘somewhat’ did not report a significant difference between males (44%) and females (54%).

3. Learning Technique preferences in an e-learning environment

Many universities now permit students to access e-learning environments whether they are MLEs i.e. linked to a central management system or Virtual Learning Environments (VLEs) which provide more of a standalone access to study materials. It was of great interest to the authors to determine how students approached their learning when offered the complete MLE experience with on-line access 24/7 to their study materials. This has been described as a ‘blended approach’ to learning:

‘the thoughtful integration of classroom face-to-face learning experiences with online learning experiences’ (Garrison and Kanuka, 2004 p96),
as it provides a blend of materials delivered in the traditional ‘face to face’ classroom environment alongside electronic access to carefully designed on-line materials and on-line environments which may include virtual groups and discussion forums. The actual amount and type of resources, the ‘blend’ itself, will vary from one module to another but extensive experience in providing on-line learning material alongside the ‘face to face’ experience has been built up at this university over the last five years where the aim has been to offer students:

‘Educational provision where high quality e-learning opportunities and excellent campus-based learning are combined or blended…so that learning is enhanced and choice is increased’. (Bullen et al 2005)

As well as a blended approach for the majority of programmes, other programmes are available which offer a complete on-line learning experience with no need for campus-based attendance.

In this survey the students were asked to rate in order of their personal preference a variety of learning techniques. These ranged from all ‘face to face’ to all ‘computer based’. The results are shown in Table 2. In examining the results there was little overall preference for first choice among the students between:

- ‘Only face-to-face’ (33.1%)
- ‘More face-to-face than computer based’ (33.8%)
- A ‘balance of computer and face-to-face’ (29.9%)

But when we looked at those highly rated for “2nd” and “3rd” place, the highest for 2nd is ‘more face to face’ (50%) and the highest for 3rd place is a ‘balance of computer and face-to-face’ (43.9%). This was difficult to interpret as there did not seem to be a preference for 1st place from the first 3 learning techniques which contain face-to-face, but when looking at the 2nd and 3rd place, it is apparent what type of learning technique students would prefer. A trend for student preferences of learning technique seems to appear: the less face-to-face and more computer based it becomes, the less highly it is rated (‘more computer based than face-to-face’ 68.8% for 4th, and ‘only computer based’ 89.6% for last).

Students appear to be showing a clear preference for choosing a campus based experience which combines elements of on-line access and computer based learning. In other words they came to university to participate in a ‘face to face’ learning experience supported by the technology to access materials when and where they wanted (cf: Barrett and Jefferies The best of all possible worlds?)

Table 2. Table showing percentage of student preference for different learning techniques

<table>
<thead>
<tr>
<th></th>
<th>1st %</th>
<th>2nd %</th>
<th>3rd %</th>
<th>4th %</th>
<th>5th %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only face to face</td>
<td>33.1</td>
<td>18.9</td>
<td>20.7</td>
<td>19.4</td>
<td>7.9</td>
</tr>
<tr>
<td>More face to face</td>
<td>33.8</td>
<td>50.0</td>
<td>11.7</td>
<td>3.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Balance between F2F and computer based</td>
<td>29.9</td>
<td>23.9</td>
<td>43.9</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>More computer based</td>
<td>2.2</td>
<td>6.7</td>
<td>21.2</td>
<td>68.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Only computer based</td>
<td>1.1</td>
<td>0.5</td>
<td>2.5</td>
<td>6.3</td>
<td>89.6</td>
</tr>
</tbody>
</table>

When considering the learning environment and students’ preferences for communicating with each other and the academic staff, they have clear preferences. When considering face-to-face learning in some more detail, it seems that face-to-face methods of learning are preferred, because students like to have discussions with people face-to-face (around 70% for each group) rather more than other methods of communication, such as discussion forum, chat, and even email. This is an unexpected
result because the survey showed that the age group 18-21 use a lot of technology such as email on a daily basis, but they would prefer not to be discussing their learning with each other over email.

However a significant 26.6% report that they would choose to contact their lecturer by email as opposed to opting for face to face contact. What students use email for on a daily basis and why they would generally prefer to have discussions with others face-to-face could be explored in more detail.

4. Anticipated Barriers to using Technology in learning

Students were invited to include all their reasons from the choices provided regarding their perceptions of the disadvantages of using technology to enhance learning, the results are reported in Table 3. There was a general mistrust of the reliability of access to technology by this sample of students with nearly 50% stating that problems with accessibility could be a disadvantage to using technology to enhance learning. This is measured in a group of students who in general do not appear to have accessibility problems and in a situation where most of them had only just started using the university’s own elearning environment. The latter point is worth examining since the students had barely arrived at university and had little experience of using the on-line environment. StudyNet had been designed to provide a very robust elearning environment so it is their early perceptions and misgivings from prior experience of technology that is being seen. This was also obvious in their primary concern raised over the disadvantages of using technology in learning; a far greater number (73.8%) thought that the general reliability of technology such as systems going down was a major disadvantage to using technology to enhance learning. It will be interesting to review students’ opinions later in the year after experiencing the university’s own elearning environment to see whether their perceived concerns, prior to relying on the technology on a daily basis, are still a cause for concern.

Cost which has been suggested in the past as a major inhibitor of taking up technology is only the fourth most important factor as a barrier to using technology for learning. Where technology is to be used by those who study at home, then universities should try to ensure that any barriers to learning are not due to failings in the institution’s technology. Students will be able to study more easily if the resources they need for independent study are accessible to them off-campus, as will be seen below, the potential to access their learning off-campus is highly prized by students. These findings reiterate the comments made by students reported in an earlier study, which demonstrated students’ enthusiasm for working from home and not having to travel to university just to access a book in the library or other notes. (Jefferies et al 2005)

<table>
<thead>
<tr>
<th>Perceived Disadvantages to using technology for learning</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General errors in technology</td>
<td>73.8</td>
</tr>
<tr>
<td>Accessibility problems</td>
<td>47.5</td>
</tr>
<tr>
<td>Less communication between students and staff</td>
<td>38.2</td>
</tr>
<tr>
<td>Less effective teaching methods</td>
<td>22.9</td>
</tr>
<tr>
<td>Cost</td>
<td>27.2</td>
</tr>
<tr>
<td>More time consuming</td>
<td>14.1</td>
</tr>
</tbody>
</table>

Table 3 The perceived disadvantages as rated by students to using technology for learning

5. Advantages to using technology to support learning

Students’ own ratings of the advantages of using technology to support learning show much enthusiasm and encouragement for academics keen to use supportive technologies. Ratings in all categories are over 50% and higher than most of the ratings for the perceived disadvantages. The
option to access their learning electronically (via StudyNet) was important to our own students. 82.9% identified access to learning while off-campus as one of the advantages of using technology to enhance learning. Another highly rated perceived advantage was that technology provided easier methods of communication (74.9%). Two thirds of the students anticipate that an advantage of using technology in accessing learning is the variety of learning styles and techniques that are made available. Other perceived advantages of using technology to enhance learning, with which over 50% of new students agreed were: improving their use of IT skills, learning at their own pace and managing time more effectively. The impression is one of greater confidence in using ICT in their courses and optimism that technology through an MLE will provide many benefits. Table 4 shows a summary of the students’ ratings of the advantages of using technology to support learning. Each of these can be examined in further detail since it is likely that the students’ perceptions of what they mean by e.g. independent learning may be different from those of the academic. These have been discussed by inter alia Russell (Russell, 2005).

<table>
<thead>
<tr>
<th>Perceived Advantages</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to learning facilities when off campus</td>
<td>82.9</td>
</tr>
<tr>
<td>Easier methods of communication</td>
<td>74.9</td>
</tr>
<tr>
<td>Improve use of IT skills</td>
<td>66.9</td>
</tr>
<tr>
<td>Learn at your own pace</td>
<td>64.8</td>
</tr>
<tr>
<td>Variety of learning styles/ techniques</td>
<td>61.1</td>
</tr>
<tr>
<td>More independence</td>
<td>59.3</td>
</tr>
<tr>
<td>Manage time more effectively</td>
<td>51.2</td>
</tr>
</tbody>
</table>

Table 4 The perceived advantages as rated by students in using technology for learning

6. Discussion and conclusions

This study set out to explore students’ prior experiences of using technology before entering our university. The purpose of the survey was to identify a baseline against which to measure both current and future students’ attitudes to technology to enhance their learning experience and their willingness to engage with technology in a new learning environment. The study also sought to measure student expectations and to provide answers to some of the questions raised about attitudes to using technology for learning and the barriers that incoming students might perceive in using technology at university. While these results only report from 7% of the actual intake it is still a significant enough number to be able to draw some general conclusions.

Just under half of the incoming students (42.2%) reported that the existence of an MLE had some influence on their decision to choose this university. This is in comparison with an earlier survey which reported that students specifically chose the university above others because of its unique on-line learning environment (Jefferies et al, 2005). It may thus appear that students now take accessible e-learning for granted, as they have become used to easy access to technology before university, whether this is true for their chosen place of study or not.

In terms of their access to technology, a very large majority of students have access to both a computer and to the internet. Although some students do have accessibility problems to either a computer and/or the internet, this is a very small minority. Surprisingly, the older students did not make up most of this minority group. All the students answering this survey did of course prove that they had access to a computer whether at home, work or in the learning resources centres of the university to be able to answer the survey.
The results of this survey give an indication of our students' lifestyle patterns before they came to the university, and also the frequency of technology used during this time. 71% of our students were studying, while 23% were working, and around 2% were either travelling or had family commitments. Of those that were studying in the last year, 75% were using email on a weekly basis, and 82% were using mobile text messaging daily rising to 94% on a weekly basis. 66% were using the internet either to learn or for leisure. When considering how much they would like to use technology in their studies, figures were very high (90% overall for 'very much' and 'moderate'), it is therefore clear that students are very comfortable with technology and expect to continue using it at university.

Certainly our students do feel that technology can enhance learning (98% say 'very much' and 'somewhat') but in contrast they do not want the technology to substitute the traditional face-to-face teaching which we currently have. These results are quite intriguing since often students appear to have the latest models of technology, whether it is mobile phones or portable music players; however they appear to want this technology to remain only as an aid and not to be a main source of learning support. One of the challenges for academics involved with teaching and learning is to provide a broad based offering, the blend referred to above of both the face to face and on-line materials. It is clear that students opting for a campus based programme want to retain the personal link with their learning. The authors agree with this and with the need to ensure that technology does not drive the learning but rather the other way round, as Salmon has said in the context of recent discussions of pedagogy and e-learning:

‘No VLE will ever be enough in itself to create great e-learning’

In terms of future work the authors view this survey as a starting point from which to build and further refine the picture of our students and their expectations. In a world of fast moving technology, the next cohorts of students might be expected to have an even higher familiarity with technology use in the classroom and the universities should be ready to provide robust and reliable e.learning systems which complement the traditional face to face approach of academics to their teaching.

References


