Changing student use and perceptions of learning technologies, 2002-2004

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The experiences of 504 students were explored by survey in their first year and their third year of study at university. Compared with first year, student engagement in paid work increased significantly and the number of days spent on campus decreased significantly by third year, though the overall number of hours spent attending classes did not change significantly. There were no significant differences in student levels of satisfaction with teaching or their university experience overall between first year and third year. Student use of information and communication technologies and their perceived usefulness of those technologies in supporting learning increased significantly over the two year period. Gender and age differences were apparent in the use of technologies. Frequency of use of learning technologies correlated with perceived usefulness of the technology. However there was a pattern of volatility in student use of technology over time in which early adopters later abandoned the technology.

Keywords: ICT, gender, age, third year students, frequency of use

Introduction

The use of the Internet "captured the imagination and interests of educators simultaneously around the globe" (Owston, 1997, p. 27). It offered many promises to Governments and institutions that had to meet the costs of increasing participation in education and training. Flexible learning was adopted by most Australian universities to allow students the opportunity to study at the own time, place and pace. In 1995, nearly 25% of colleges and universities in the US offered degrees with significant online content (Merisotis, 1999). In 2001, over half of all courses offered in Australian universities contained some online content (Bell et al, 1999). The adoption of internet technologies to support learning was variable – some institutions moved quickly to provide online materials whilst others were more cautious.

The effectiveness of learning technologies in improving student learning outcomes remains an area of continuing debate. In terms of the use of computer assisted learning, a review of 355 studies showed no significant difference in the effect of CAL in enhancing learning (Russell, 1999), whilst others have reported enhancement of learning under specific conditions (Andrew & Isaacs, 1995). In terms of student development, the use of computers has been correlated with self-reported gains in independent learning and problem solving (Kuh & Vesper, 2001), cognitive development and critical thinking (Flowers, Pascarella and Pierson, 2000). The use of learning technologies may also have some adverse consequences (Upcraft, Terenzini & Kruger, 1999) and the impact of learning technologies does not appear to be consistent for all students. Flowers, Pascarella and Pierson (2000) reported that cognitive effects of the use of computers were not uniform across the student body or institutions – higher performing students appeared to gain most. Student attitudes and perceptions may also play a significant role. Differences in access to the technologies, comfort and competence in use, preferred learning style and lifestyle or work patterns can all affect student use and benefit from learning with technology (Schrum & Hong, 2002).

First year at university is when most students will encounter their greatest exposure to learning technologies, although some school leavers may have used a LMS in their studies. The level of academic and social engagement in first year is the key to many students' experiences of, and success, in higher education (Cook & Leckey, 1999; McInnis, 2001). It is a major period of transition for many – matching expectations with reality and developing the necessary skills to become a self-directed independent learner in a technology rich learning environment. Many students entering university are uncertain what studying in a flexible learning environment involves for them as learners (Taylor, 2000). This is supported by data from a 1994 and 1995 snapshot study of the Australian first year university experience that revealed although many courses have learning technology support, up to a third of all students had

not used the technologies (McInnis, James & Hartley, 2000). The purpose of this longitudinal study was to explore of a group of students' changing experiences and behaviours on campus and with learning technologies, in their first year and again in their third year at a large multi-campus metropolitan university. The nature and frequency of use of various learning technologies was examined together with self-reported usefulness of those technologies in supporting learning. Finally, student perceptions of quality and their overall experience at university were also explored.

Methodology

An online survey (http://www.SurveyMaker.com.au) was conducted to explore aspects of students' experiences of their university learning environment in their first year and again in their third year of studies. The confidential online surveys sought answers about students' time on campus, use of learning technologies and perceptions of quality of teaching. The online survey used a variety of questions: free text responses, multiple choice questions, and 5-point Likert questions (e.g. with ratings from "strongly agree" to "strongly disagree", with a midpoint of "no opinion"). In 2002 an email was sent to all 6600 first-year students with responses received from 1841 students (28%). In 2004, an email invitation to participate in a repeat survey was sent to the 1657 participants in the 2002 survey who were still enrolled at the institution. Statistical analyses were performed on unmodified data (i.e. scales not collapsed) using SPSS (Version 12.0). Cases where there were responses to less than 90% of questions were excluded from the final data set/ Data for individuals in 2002 and 2004 were analysed using Friedman's test for related samples and other non-parametric tests as indicated. Given the large numbers of items, statistical significance in non-parametric tests was recognised only when $p \leq 0.001$. For the purposes of reporting data in this study the five point scales were collapsed into a three point ordinal scale (e.g. agreement, uncertain and disagreement).

Results

The response rate from the 1648 students still enrolled at the institution in 2004 was 35% (n=579). After cleaning of data, the total number of cases reported was 504. The distribution of responses from the 504 respondents is shown below (Table 1.). The majority of respondents were enrolled full time (95%), female, Australian born and aged under 20 years. About 60% of students were first generation students. In 2002, there were significant proportions of students who were primary carers for their household (17%) or primary income earner for their household (19%). These proportions had not changed significantly in 2004. Approximately 10% of students identified with both roles in 2002 and in 2004.

Table 1: Characteristics of the survey population 2002-2004 (n=504)

Campus	N	%	Country of Birth	N	%
Nathan	185	36	Australian born	404	80
Gold Coast	167	33	Overseas born	98	20
Mt Gravatt	66	13	**Age Groups**		
Logan	57	11	< 20	290	57
South Bank	29	6	20-25 years old	123	24
			>25 years old	82	19
Gender: Female	338	67	**First generation student**	292	58
Primary Carer	84	17	**Primary Income Earner**	100	19

A range of survey questions sought to evaluate students' time commitment to their university studies. In 2002, the majority of Griffith first-year and third-year students visited their home campus 3-5 days per week. Students aged over 25 years were less likely than younger students to visit the campus on more than 4 days per week. First year students spent less than 4days on campus (on average) and this decreased significantly (χ=10.65, p<0.001) as they progressed into the third year of their studies.

Commitment to the university was also examined in a series of questions asking about time spent on university studies, family and work related commitments (Table 2). The pattern of data from 2002 and 2004 were very similar. Time for preparation for classes did not change significantly, nor did the number

of hours of class attendance decrease significantly from first year to third year. Students spent significantly more time engaged in paid employment as they progressed from first year to third year (χ =50.685, p<0.001). There were no significant differences in the proportions of students aged under 25 years and students aged over 25 years who were engaged in paid employment in 2002 or 2004.

Table 2: Time invested on university social matters (% of 504 students)

Item	Year	Hours						
		0	0-5	6-10	11-15	16-20	21-25	26+
Hours of preparation for class	2002	0.5	26	24	20	12	8	8
	2004	2	23	20	20	14	12	8
Hours attending classes	2002	0	3	10	40	26	14	4
	2004	8	18	31	21	14	7	0
Hours in paid employment. *	2002	37	9	12	16	12	8	4
	2004	21	7	15	19	16	11	10
McInnis et al, 2000		40	9	19	15	10	3	4

After McInnis et al (2000), Table 4.2, 4.5 and 4.6. * p<0.001

Section 1: Learning activities and experiences

Academic orientation and academic application (Tables 3 and 4) reflect the extent to which students take on the academic values and norms of the university and its staff (McInnis et al, 2000, p. 20). The majority of students enjoyed the intellectual challenge and the theoretical content of their courses. Whilst the majority found lectures valuable and interesting, about 10% of students found them uninteresting and less-than valuable learning experiences. Notably about one third of students weren't sure that lectures were interesting or valuable learning experiences and did not gain much satisfaction from studying. By the third year of study, about 10% more students reported less stimulation and less value in lectures than they did in first year. Overall, however there was no significant difference in academic orientation scores in first year compared with third year.

Table 3: Academic orientation. Scale collapsed (% of 504 students)

	Year	Disagree	Neutral	Agree
I enjoy the intellectual challenge of my courses.	2002	3	19	76
	2004	5	10	85
McInnis et al, 2000		12	27	61
I enjoy the theoretical content of my courses.	2002	8	28	64
	2004	12	16	72
McInnis et al, 2000		24	36	40
Lectures and presentations stimulate my interest in the course.	2002	13	34	53
	2004	19	24	57
McInnis et al, 2000		20	35	46
I have found most of my courses really interesting.	2002			
	2004			
McInnis et al, 2000		20	29	50
Lectures are a valuable learning experience for me.	2002	10	24	64
	2004	18	19	63
McInnis et al, 2000		15	27	58
I get a lot of satisfaction from studying.	2002	12	35	57
	2004	16	26	58
McInnis et al, 2000		25	35	40

In terms of academic application, nearly half of the first-year and third-year students reported difficulty with motivation for study, even though many worked consistently throughout the semester and expressed a very strong desire to do well (Table 4). In third year, about 10% of students reported that they sought advice from teaching staff more often than they did in first year, but also they worked less consistently

throughout the semester. Overall, there was a moderate correlation between academic application in 2002 and in 2004 (r=0.413, p<0.01), but no significant difference in the level of academic application of students in first year compared with third year.

Table 4: Academic application. Scale collapsed (% of 504 students)

	Year	Disagree	Neutral	Agree
I work consistently throughout the semester.	2002	18	28	53
	2004	28	14	56
McInnis et al, 2000		38	25	37
I generally find it difficult to get myself motivated for study.	2002	24	27	49
	2004	30	19	51
McInnis et al, 2000		23	29	48
I regularly seek the advice and assistance of teaching staff.	2002	39	36	24
	2004	42	22	35
McInnis et al, 2000		50	31	19
I have a strong desire to do well in all of my courses.	2002	1	7	92
	2004	2	8	90
McInnis et al, 2000		4	15	81

McInnis et al (2000), Table 3.2

Students perceptions of teaching
Student perceptions of teaching were evaluated using questions drawn from the national First-Year survey (Table 5, McInnis et al, 2000). The majority of first year students in 2002 reported that staff were enthusiastic and tried to make courses interesting, were approachable and available, good at explaining things and provided helpful feedback on student progress throughout the semester (Table 5). Students reported strong agreement with the statement about helpful feedback and taking an interest in student progress. There was a significant correlation between students perceptions of teaching in 2002 and in 2004 (r=0.317, p<0.01).

Section 2: Use and value of learning technologies

Understanding of the university's intentions for introducing flexible learning appears to be high amongst the 2004 student population (Table 6) a situation that has developed over time. When asked about what flexible learning meant in 2002, the greatest proportion of first-year students responded that it meant "less staff contact". Slightly lower percentages of students considered that flexible learning meant study at a time and place of their convenience, access to online materials and learning using a variety of resources. In 2004 there was a significant shift in which these now-third-year students saw flexible learning more as a way for them to take greater responsibility for their own learning, through use of a variety of online and other learning materials and resources.

Use of learning technologies
Students used communication and learning technologies with increasing frequency over the last three years (Table 7). The frequency of use of email to contact staff and fellow students increased significantly (χ=20.56, p<0.001) (χ=53.15, p<0.001). This increase was largely due to higher usage by students aged under 25 years. It is interesting to note that about 15% of students, across all age groups, still did not use email to contact other students or staff at the university. The use of discussion forums (χ=100.76, p<0.001) and course websites accessed from home (χ=157.81, p<0.001) or accessed from work (χ=169.40, p<0.001) also increased significantly. In 2002, about one third of first-year students reported rarely or never using SMS text messaging to contact other students or email to contact staff and fellow students. By 2004 this proportion had almost halved , though 21% of students who rarely/never used text messaging to contact peers in 2002 continued to rarely or never use it in 2004 (Table 7). There was no correlation between overall frequency of CIT use and perceptions of teaching or overall satisfaction with university experience.

Table 5: Students' perceptions of teaching (POT). Scale collapsed (% of 504 students)

	Year	Disagree	Neutral	Agree
Staff try hard to make the courses interesting.	2002	8	21	71
	2004	10	17	73
McInnis et al, 2000		17	34	50
The teaching staff are good at explaining things.	2002	8	32	60
	2004	11	22	67
McInnis et al, 2000		17	35	48
Teaching staff are enthusiastic about the courses they teach.	2002	7	24	69
	2004	9	19	72
McInnis et al, 2000		12	32	56
Most of the teaching staff are approachable.	2002	4	14	82
	2004	6	9	85
McInnis et al, 2000		12	26	62
Staff are usually available to discuss my work.	2002	11	31	58
	2004	13	23	64
McInnis et al, 2000		25	37	38
Teaching staff usually give helpful feedback on my progress through the course.	2002	23	37	41
	2004	23	29	47
McInnis et al, 2000		40	34	25
Teaching staff make a real effort to anticipate difficulties that I may be having with my studies.	2002	16	43	39
	2004	18	43	41
Teaching staff make a real effort to respond to difficulties that I may be having with my studies.	2002	12	37	51
	2004	11	36	52
Most teaching staff in my courses take an interest in my progress during the semester.	2002	27	39	33
	2004	28	35	36
McInnis et al, 2000		47	32	21
Interaction with the teaching staff is an important part of my learning in this course.	2002	11	28	61
	2004	11	22	67

Table 5.1, McInnis et al (2000).

Table 6: Students understanding of flexible learning. Scale collapsed (% of 504 students)

Flexible learning means …	2002	2004
More choice over what I learn	4	7
Learning at places of most convenience	5	10
Less obligation to attend classes	7	7
Group work	9	4
Access to a range of learning materials and resources	10	13
Taking more responsibility for my own learning	11	18
Access to online materials	12	18
Learning at my own pace	12	10
Learning at time of convenience	12	7
Less staff contact	16	5

The frequency of use of technologies differed by gender and across age groups. In 2004, older students were significantly more likely than those aged under 25 years to email academic staff members about study matters ($\chi=14.9$, $p<0.01$). Younger students were more prolific users of text messaging ($\chi=39.81$, $p<0.001$), with males being the greatest users of text messaging for peer communication ($\chi=8.40$, $p<0.01$) and communication about study matters ($\chi=22.4$, $p<0.001$). There were no gender or age differences in use of discussion forums or accessing of online information from work or home. Blogs were read or written on a regular basis by 75% of students in 2004. This behaviour was equally spread across broad age groups, however women read and wrote web logs significantly more frequently than men ($\chi=8.1$, $p<0.01$).

Table 7: Frequency of use of technologies for learning. Scale collapsed (% of 504 students)

Please indicate how frequently you do the following:			Rarely/ Never	Occasionally, Often, V Often
Use email to contact fellow students about study matters?	2002	*	37	63
	2004		16	84
Use email to communicate with staff members about study matters?	2002	*	31	69
	2004		17	83
Use SMS text messaging to contact other students?	2002	*	34	76
	2004		20	80
Use discussion forums on course websites to communicate with other students and staff?	2002	*	45	55
	2004		14	86
McInnis et al, 2000			91	30
Access course websites, library or university information from on-campus?	2002	*	34	66
	2004		8	92
McInnis et al, 2000			*67*	*33*
#Access course websites, library or university information from home or work ?	2002		37	63
	2004		10	90
McInnis et al, 2000				60

After McInnis et al (2000), similar data from Table 3.7 and 3.9. * $p<0.001$

There were consistent patterns in students' changing use of technologies. These patterns were observed in frequency of student use of email to contact peers, use of email to contact academic staff about study matters and use of text messaging to contact peers. It was also evident in students' perceived usefulness of email contact with staff and peers for study matters, and learning benefits derived from participation in discussion forums. The pattern is illustrated in one example regarding student use of email to contact academic staff about study matters (Table 8). It can be seen that of the early adopters of the technology who used email frequently to contact academic staff in 2002, 50% now use email rarely or never to contact academic staff in 2004. The overall significant increase in use of email to contact academic staff from 2002 to 2004 is due to 15% of students who occasionally used email using it more frequently to contact academic staff in 2004, and 53% of students who rarely used email then, now using it occasionally or frequently to contact academic staff in 2004. Nearly half of the students who rarely or never used email to contact academic staff in 2002 continued not to use email to contact academic staff in 2004.

Table 8: Changing use of email to communicate with staff about study matters in 2002 and 2004 (n=504) Percentages are in reference to the numbers of respondents to question in 2002

2004	2002		
	Very Often/Often used In 2002 (n=114)	Occasionally used In 2002 (n=231)	Rarely/Never used In 2002 (n=159)
Very Often/Often	18%	15%	18%
Occasionally	32%	39%	34%
Rarely/Never	50%	46%	47%
	100%	100%	100%

Consonant with questions about the frequency of use of communication technologies for learning, were questions about the usefulness of those technologies in supporting student learning (Table 9). There was a strong correlation between frequency of use of technologies and their perceived benefit for learning ($r=0.566$, $p<0.01$). There was no correlation with perceptions of teaching, satisfaction or GPA. In 2002 around half of the first year students indicated that email contact with staff and other students was useful for their learning. Discussion forums were not used by nearly 30% of first-year students in 2002 (they chose not applicable), but of those students who did use discussion forums, one third found them to be useful for their learning. From 2002 to 2004, there was a significant increase in the number of students who reported that email contact with other students ($\chi=70.69$, $p<0.001$) and staff ($\chi=9.95$, $p<0.001$) was useful for their study. There was also a significant increase ($\chi=75.29$, $p<0.001$) in perceptions of the usefulness of discussion forums to support learning over the same period of time.

Accessing course websites was easy for the majority of students in 2002 and this continued in 2004. Notably some 8% of students continued to report difficulty in accessing web-based materials in 2004: only one quarter of these people reported such difficulties in 2002. The great majority of students reported that accessing course materials from on-campus or at home/work was useful for their learning and in 2004 there was no significant change in their perception of the usefulness of those resources in supporting their learning. In general cross-tabulations reveal that the majority of students (60-70%) had not changed their opinions during the period of time between surveys. Responses were consistent across some items. For example, the students who found the use of online materials to be motivating in 2002 were largely drawn from the same pool of students that reported that access to course materials from on-campus and home to be useful for their learning. The majority of students who reported that accessing online materials was useful for their learning in 2002 reported similarly in 2004.

Table 9: Usefulness of technologies for learning. Scale collapsed (% of 504 students).

		Disagree	Neutral	Agree
Email communication with other students was important for my study and learning.	2002*	28	27	39
	2004	12	17	71
Email contact with teaching staff was important for my study and learning.	2002*	14	29	52
	2004	13	16	71
Participation in online discussion forums with staff and students was important for my study and learning.	2002*	27	28	17
	2004	30	22	27
The course web sites play an essential role in helping me learn.	2002	8	21	69
	2004	12	14	74
Accessing web-based resources and information was easy for me.	2002	8	11	71
	2004	8	9	83
Accessing web-based resources and course information from home was useful for my study and learning.	2002*	4	8	80
	2004	11	9	82
Accessing web-resources and course information on campus was useful for my study and learning.	2002	6	20	70
	2004	9	13	78
The use of web-based resources increased my motivation to study and learn.	2002	16	32	50
	2004	19	31	50
I prefer using printed materials rather than on-screen materials when I have to think carefully about what I am reading.	2002	5	15	78
	2004	9	13	78
I learn better using computer-based materials (Internet, CD-ROM, simulations) rather than printed materials.	2002	42	40	18
	2004	44	36	20
I prefer to learn from information on the Internet rather than textbooks or library books.	2002	38	35	24
	2004	35	34	31
I have become more critical of information I find on the Internet.	2002	5	23	70
	2004	4	11	85

Absent percentages refer to N/A choice. After Tables 3.7, 3.9 and 3.10, McInnis et al (2000). * p<0.001

The overwhelming majority (80%) of first-year students in 2002 indicated that they preferred to use printed materials when thinking carefully about the materials was necessary (Table 9). The majority of students (60%) did not change their preference for printed materials from 2002 to 2004. Of those students who were unsure of their preference in 2002 (n=75) or who preferred screen materials (n=21), 52 of 75 and 11 of 21 reported in 2004 a preference for print over screen-based materials. Only two students continued to prefer screen based information over print materials for the purposes of close study. The student population in 2002 was split as to whether they preferred to learn using technology-enhanced resources or printed materials and this situation had not changed significantly in 2004. A significantly greater number of students (χ=10.51, p<0.001) reported an awareness for increased critical evaluation of Internet materials in 2004 compared with 2002.

Student satisfaction
Students were asked about their overall satisfaction and perceived benefit of their university studies over the last two years (Table 10). There was a moderate correlation between students' level of satisfaction and perception of worth of their university experiences in both 2002 (r=0.370, p<0.001) and 2004 (r=0.495, p<0.01). There were no significant differences in each student's reported levels of satisfaction or

perceived worth of their university experiences in first year compared with third year, by age, gender, or country of birth.

Table 10: Satisfaction with university experiences. Scale collapsed (% of 504 students)

	Year	Disagree	Uncertain	Agreement
Overall, I am satisfied with my university	2002	5	23	77
experience so far.	2004	8	17	75
Overall, my university experiences have been	2002	2	11	87
worthwhile.	2004	6	11	84

Discussion

This study is one of the first to track the changing behaviours and perceptions of a group of students over the three years of their undergraduate degree. American (e.g. Kuh & Hu, 2001) and Australian studies (e.g. McInnis et al, 2000) provide snapshots of the changing character of the first year student population over time. There are three major findings of this study. First, the first year experience of these students is broadly consistent with the account of McInnis et al, 2000. Second, the students' frequency of use and perceived usefulness of learning technologies increased significantly over time. Third, there appeared to be a pattern of changing use and perceived usefulness of technologies over time.

The first year academic experience of students in this study compares well with the aggregated national data of first-year attendance reported by McInnis et al (2000). Our first year students tended to have fewer contact hours, spend less time on campus and work slightly longer hours than the national average. Our first-year students. reported greater enjoyment of the intellectual challenge and the theoretical content of their courses. Whilst they reported greater learning value derived from attending lectures, the level of stimulation from those lectures was lower than the national experience. Overall first-year students held generally more favourable perceptions of teaching and greater satisfaction with their university experience than those reported as the aggregated national first-year student data.

The adoption of an "on-campus and on-line" approach to flexible learning appears to have resulted in mixed messages for first year students. This may be related to variable experiences in difference courses, however many students saw flexible learning as providing access to a range of online resources and less than expected contact with academic staff. Significant numbers of students reported inadequate feedback from, and limited availability of, academic staff. It is very likely that an unintentional over-emphasis on the use of IT occurred at the expense of structured class time, a situation typical of flexible learning environments (Nunan, 1996). These data offer support for Taylor's (2000) argument that more should be done to inform students of the aims of flexible learning and to prepare them better to make the transition to more independent modes of learning.

In 2002, first year students at our institution showed greater frequency of use of learning technologies than that reported nationally in 1999 (McInnis et al, 2000). Email was used regularly by about three fifths of student at our institution, which was slightly higher than shown in the national data. There was also greater use of online course materials accessed from home or on-campus and higher participation in discussion forums. The latter is attributed to the adoption of a learning management system (LMS) at our institution and such LMSs were not well established nationally at the time of McInnis' survey in 1999. Notably, about 40% of students in this 2002 study, in a larger first-year study (Zimitat, 2003), and in that of McInnis et al (2000) rarely used email or accessed course information.

Overall changes in use of learning technologies by third year

Student use and perceptions of the usefulness of learning technologies both increased significantly over the period 2002 to 2004. The use of email to contact peers increased significantly, as did the frequency of accessing course information from on-campus. The percentage of students who rarely or never used email decreased from 37% in 2002 to 16-17%. A change in university policy to indicate that email is the preferred means of contact has probably encouraged greater student use. There was a four-fold decrease in the number of students who rarely accessed course materials on- or off-campus. The use of SMS messaging amongst students remained high with nearly 4 of 5 students using it to contact other students.

Its popularity no doubt related to the high market penetration of mobile phones and the immediacy of contact compared with email. An indication of the rapid adoption of web-technologies is the finding that 75% of students often or very often read or write web logs. Whilst the rapid adoption of new technologies and web tools is seen as a positive step, there remains a question as to what to do about the 10-15% of students who in third year still remain technologically isolated. Further work needs to be done to identify these students and ascertain if there are particular barriers preventing their use of technology.

The use of learning technologies has been positively associated with other forms of student engagement (Kuh & Hu, 2001). In this study there was a marginal correlation ($r<0.25$) between use of technologies, perceived usefulness of technologies and satisfaction, GPA and perceptions of teaching. Aggregation of data from several years may provide sufficient statistical power to further test these relationships.

Individual changes in use of learning technologies

The longitudinal nature of this study enabled the tracking of individual students' changing use and perceptions of learning technologies. Whilst the cohort data illustrates significant increases in the frequency of use and perceived usefulness of technology to support learning, the individual data shows significant differences. The preference for printed (paper) materials over screen materials for study appeared to be relatively stable. However, in many cases, the early adopters of email, texting and discussion forums have abandoned use of these communication modes in 2004. Similarly, a significant number of individuals who reported great benefits from the use of learning technologies now, two years later, report few benefits of those same learning technologies. In a US study covering all age groups, similar volatility has been reported and attributed to a range of factors (e.g. finance, experiences with ISPs) (Lenhart, 2003). A similar pattern of changing behaviour and perceptions was reported in an 18 month study following a group of academics keenly involved in e-learning (Zemsky & Massy, 2004). At the end of the 15 month period, 25% of the 'early adopter' academics had changed their minds regarding the uptake and potential of e-learning. The authors suggest that the participants were refining their views through experience. In our study the changes could be due to users finding the technology not to be as useful as first thought. Alternatively, the third year courses may not have seen the same extent of course development of first year courses and academic staff may also not have been using all features of the LMS. Poor course design is a significant factor impacting upon students perceptions of the usefulness of online learning experiences (Song et al, 2004). In this case, it is most likely that students' early expectations and experiences of the learning environment and technology were not sustained across the degree program or campuses.

Further work

The limitations of this study relate primarily to the limited numbers, and the exclusive use of quantitative data drawn from online surveys. The use of specific item scales would enable proper psychometric assessment of relationships between use of technologies and other aspects of the student university experience. Increasing the number of respondents would also achieve greater statistical power to examine these relationships. The online survey itself could bias participation in the study against those with limited internet access or low IT literacy. Running a parallel paper based survey, or an exclusively paper-based survey would provide some indication of the extent of such bias. Finally, the use of open ended questions on any future surveys might help to yield further information to facilitate interpretation of data, particularly that related to volatility of student perceptions of usefulness of learning technology.

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