

“Laptops are better.” Medical students' perceptions of laptops versus tablets and smartphones to support their learning

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Abstract

In recent years there has been a shift from the expectation that students will be supporting their learning with desktop and laptop computers to the increasing use of tablet computers (Payne, Wharrad, & Watts, 2012). This move has been reflected by initiatives from universities in the US and UK that have provided medical students with tablets to support their studies (Mathis, 2011; The University of Manchester, 2013).

Noting this trend and considering how tablets might better support medical students, lecturers within the medical school at Lancaster University sought to find out whether their students – who had been provided with a laptop when they began their studies – perceived that they would be better served in their medical degrees by issuing them with either a laptop or a tablet. In March-April 2013, 137 students completed an online questionnaire which included open questions in which they were also encouraged to qualify their reasons.

The quantitative results showed clearly that the students wanted to retain the provision of laptops rather than receiving tablets and this view was reinforced by responses to the open questions. For example, the responses showed that the medical students had a clear preference for writing up reports on a laptop rather than on a tablet. Even so, responses to the questions suggested some limitations in how far the students understood and used the capabilities of tablet computers even amongst those who already owned a tablet and/or a smart phone. Results were surprising in light of the noted trend towards tablet provision and uptake amongst medical students and therefore warrant further consideration. Emerging findings suggest that many of the medical students do not perceive tablets as suitable devices for writing, which brings forward issues relating to the concept of affordances (Parchoma, in press) and possibly medical students' levels of digital literacy. These and other ideas will be much further developed by the point of the conference.

The paper is currently work in progress. A literature review is underway; quantitative results have been analysed and coding has just begun for the analysis of the qualitative results. The results of the study will be presented at the conference for feedback.

Keywords

Laptop, tablet, smartphone, digital technologies, medical students, learning, digital literacy, affordances

Introduction

Media headlines over the last 2-3 years have suggested a trend towards the uptake of tablet computers and smart phones to be used by medical students as part of the curriculum. A BBC article in 2010 described how medical students at Leeds University were being issued with iPhones to access online textbooks and keep in close contact with students training in hospitals (Coughlan, 2010). A further article in 2011 from MacWorld describes the provision of iPads to medical school students at Yale University (Mathis, 2011) Also in 2011, Mobihealthnews published an article about the importance of incorporating mobile devices into the medical curriculum at nine US medical schools (Donlan, 2011). And again Mobihealthnews published an article in 2013 stating that the first year of medical students to be given iPads at the University of California Irvine's medical school scored an average of 23% higher on national exams than previous classes (Comstock, 2013).

Nevertheless, at present, there is very little research published in academic journals about the use of tablets by medical students (Robinson & Burk, 2013). Robinson and Burk (2013) carried out an online questionnaire with 7 medical schools in the United States in 2012 sampling 689 medical students. They found that the Apple iPad was the most frequently used tablet (41.8%) with android tablets being the second most popular (5.7%). Daily use was reported by 25.5% of the medical students. Common activities were accessing medical reference applications, e-books and to study for board exams. Students used tablets more during the clinical years of medical school. George et al. (George et al., 2013) carried out a study to investigate the effectiveness of iPads in undergraduate medical education following the provision of iPads to first year students at the Warren Alpert Medical School of Brown University, USA in 2011-2012. They administered the same survey twice to 109 first-year students to track attitudes over a period of 4 months. They also carried out two focus groups. The results showed mixed attitudes towards iPad use. The majority of students agreed that 'the iPad has value in the medical curriculum' (79% in the first survey; 65% in the second survey). However, they also showed a decrease in perception of value over time. Also, while focus groups suggested that students found certain uses of iPads useful, they did not believe tablets could replace printed handouts. This raises questions related to the concept of affordances (Parchoma, in press) (Conole & Dyke, 2004) and medical students' levels of digital literacy (JISC, 2013).

In light of these findings and the need for further research, the project investigated the following research questions:

- Do medical students currently own a tablet and/or smartphone?
- How do medical students currently use tablets and smartphones for learning?
- Do medical students think that a tablet or laptop best suits their learning needs and why?
- Does the ownership of a tablet or smartphone influence students' attitudes to whether a tablet or laptop best suits their learning needs?

Methods

Students in Years 1-4 of the medical degree (MBChB) at Lancaster University were asked to complete a survey in order to inform future provision of laptops or tablets to first year medical students. The survey was created and deployed using SurveyMonkey (SurveyMonkey, 2013) and included scaled responses and free-text entry. Responses were collected between the 28/03/13 and 14/04/13. The data was collected as a routine part of the development of the degree programme, and ethical approval to use routinely collected data from consenting students was granted by the Faculty of Health and Medicine Research Ethics Committee at Lancaster University.

Of the 200 students in years 1-4, 160 students (80%) completed the evaluation. Of those, 137 students consented to the use of routinely collected data for research purposes. The completion rates for students consenting to use of their data were as follows:

Table 1: Survey completion rates

Year 1	96% (n= 43/45)
Year 2	82% (n= 37/45)
Year 3	91% (n=42/46)
Year 4	56% (n=15/27)

The survey was structured around the components of the medical degree which at Lancaster University is based on a Problem-based learning (PBL) approach. In PBL, the students work in small groups with a facilitator. Each two-week module is based around a clinical scenario from which students derive their learning objectives (LOs). Each student then learns, mainly through self-directed study, and students discuss their learning in feedback sessions.

Medical students are required to spend time during their degree working in-depth on topics of their choosing (within a broad selection) which are not covered in the curriculum. One of the ways students fulfil this criteria is through completion of Special Study Modules (SSMs). These are 4 week projects which take a number of forms, including structured reviews, interpretative and case-based studies. Students are required to conduct searches of appropriate databases to find relevant primary literature relating to their topic. The culmination of

the SSM is a 3000 word report, including referencing in the Vancouver system. At times throughout the degree, students are required to prepare and present posters and talks.

Students in Year 2 onwards spend a significant proportion of their time on clinical placements in General Practice (GP) surgeries and hospitals. To facilitate learning, students are required to submit written descriptions detailing a number of the patient cases they have experienced. These follow a pro-forma and include the patient's history, signs and symptoms, differential diagnosis, pathophysiology, investigations and treatment.

In summary, the survey and open questions aimed to investigate the use of laptops, tablets and smartphones for the following:

- Research Problem Based Learning, learning objectives (PBL LOs)
- Research Special Study Module (SSM) and other course assignments
- Write Special Study Module (SSM) and other course assignments
- Prepare a poster or presentation
- Write up clinical cases.

Given that all students are provided with a University laptop at the start of their studies, ownership of laptops was not a focus for the questionnaire. However, questions were asked about tablet and smartphone ownership based on the assumption that students who own tablets and smartphones may be influenced in their responses to the questionnaire by their familiarity with these devices in two possible ways: they have motivation (and the material resources) to acquire a tablet or smartphone (suggesting a potential predisposition to use); they may have more familiarity with the capabilities of these devices.

The quantitative data was analysed using SPSS Version 21 (IBM Corp., Released 2012). A two-sided Fisher's exact test was used to determine statistical significance (at the $\alpha = 0.05$ level) as the expected value in some cells was less than five.

The qualitative data was analysed through the 'constant comparison' method (Strauss, 1987). Texts were read to build an overall awareness of the data. An initial code list was developed and refined to directly relate to the research questions above. The data was coded into these categories and analysis is underway.

Results

Quantitative data

Do medical students currently own a tablet and/or smartphone?

Overall, twenty-seven per cent ($n=37/137$) of students owned a tablet, and 73.0% of students ($n=100/137$) did not (Table 2). Ownership of a tablet was not related to the year of study (Fisher's exact test $p=0.442$).

Students were asked if they had their own smartphone. Of the 137 respondents overall, 83.2% ($n=114/137$) own a smartphone and 16.8% ($n=23/137$) did not (Table 2). Ownership of a smartphone was not related to the year of study (Fisher's exact test $p=0.525$).

Table 2: Ownership of Tablets and Smartphones in relation to year of study

		Year of study				Overall	p=
		1	2	3	4		
Tablet – number (%)	Yes	12 (27.9%)	13 (35.1%)	8 (19.0%)	4 (26.7%)	37 (27.0%)	0.442
	No	31 (72.1%)	24 (64.9%)	34 (81.0%)	11 (73.3%)	100 (73.0%)	
Smartphone – number (%)	Yes	36 (83.7%)	28 (75.7%)	37 (88.1%)	13 (86.7%)	114 (83.2%)	0.525
	No	7 (16.3%)	9 (24.3%)	5 (11.9%)	2 (13.3%)	23 (16.8%)	

How do medical students currently use tablets and smartphones for learning?

Students who own a tablet rated how often they used the tablet for learning related tasks (Figure 1).

Sixty eight per cent of students (n=25/37) who own a tablet used their tablet to research their PBL learning objectives at least some of the time, and 16.2% (n=6/37) always use their tablet for this task. Fewer students use their tablet to research SSMs and other course assignments, with 43.2% (n=16/37) doing so at least some of the time and only 8.1% (n=3/37) of tablet owners always use their tablet. The vast majority of students (73.0% n=27/37) never use their tablet to write SSMs and only one student (2.7% n=1/37) used their tablet to do so all of the time. Similarly, 70.3% (n=26/37) of tablet owners had never prepared a poster or presentation on their tablet, with small numbers completing this task at least some of the time (16.2% n=6/37). Forty per cent (n=10/25) of tablet owners did not use them to write up clinical cases, whereas 40% (n=10/25) wrote up cases using their tablet at least some of the time.

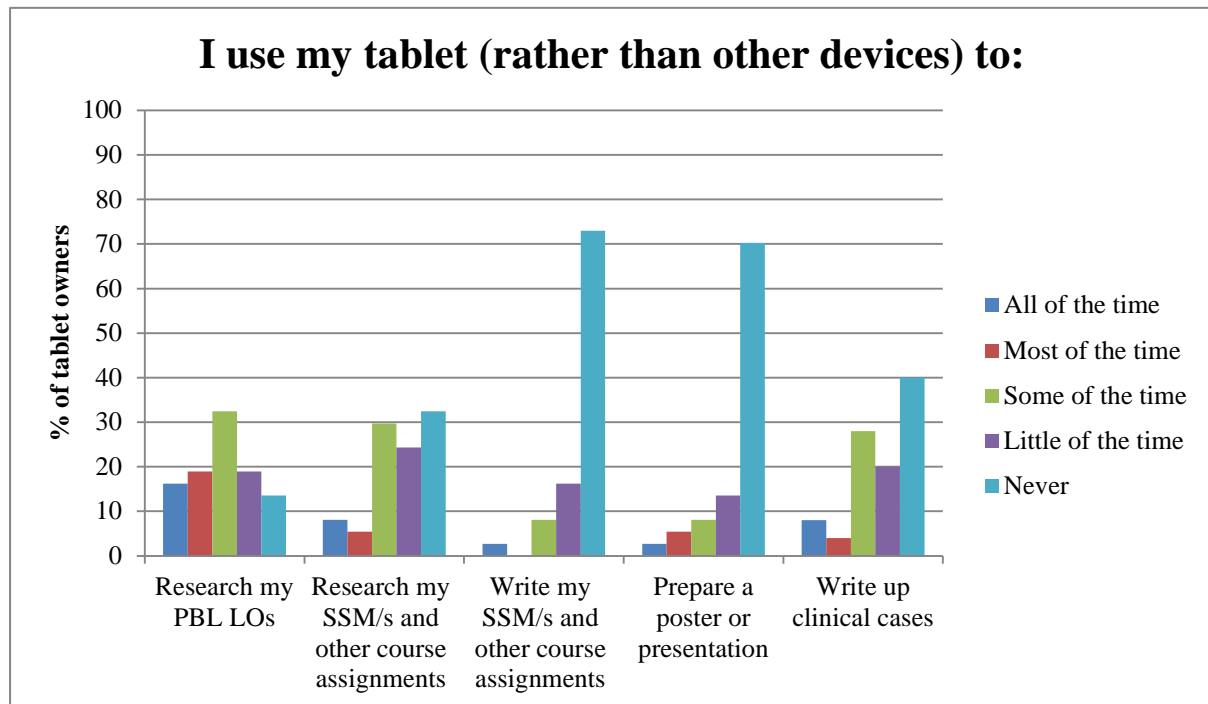


Figure 1: Medical student use of tablets for learning (Note: First year medical students do not write up clinical cases as they do not attend clinical placements.)

The survey respondents who own a smartphone were asked to rate how frequently they use their smartphone for tasks related to their learning (Figure 2).

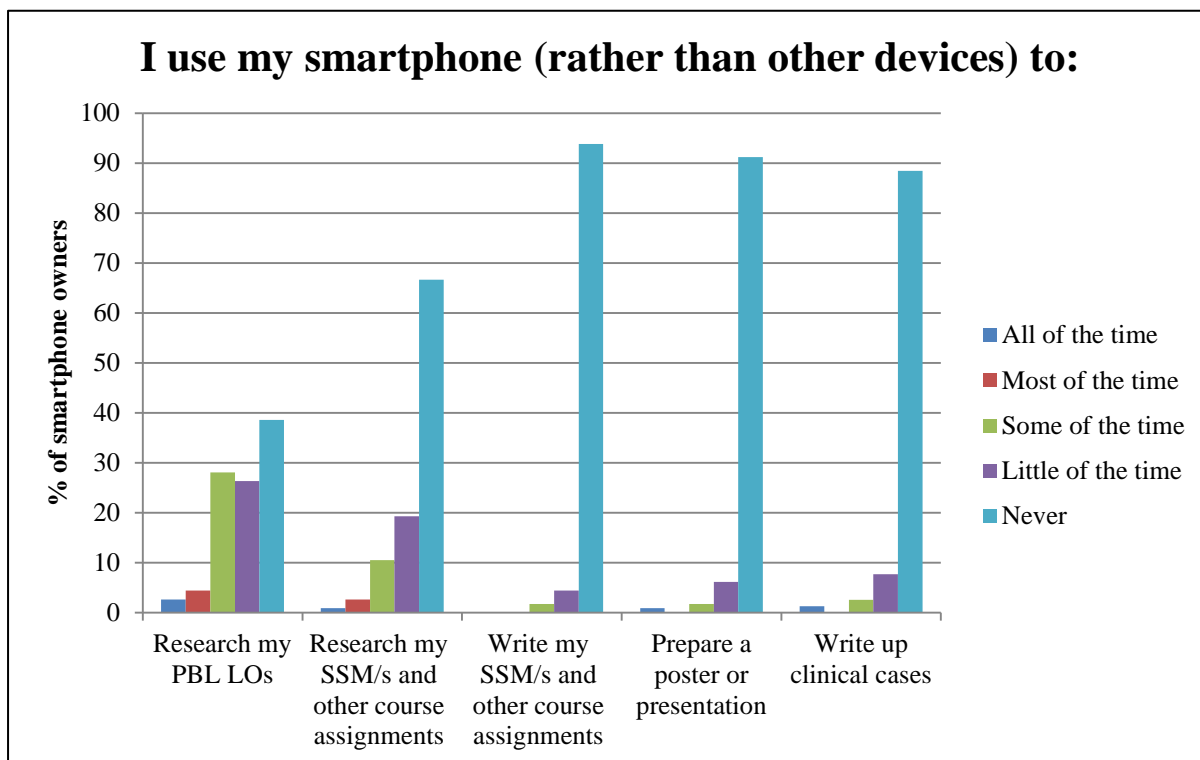


Figure 2: Medical student use of smartphones for learning (Note: First year medical students do not write up clinical cases as they do not attend clinical placements.)

The majority of students had never used their smartphone for any of the tasks, although the proportions varied from 39% never researching their PBL learning objectives and 67% never researching SSMs and other course assignments, to 94% never writing SSMs and other course assignments, 91% never preparing posters or presentations and 88% never writing up clinical cases.

Some students used their smartphone to conduct research to meet their PBL learning objectives little (26%) or some (28%) of the time and a very small proportion (3%) all of the time. A smaller percentage of the smartphone owners used their phone to research their SSMs or other course assignments little (19%) or some (11%) of the time, with only 1% always using this device to research these assignments. In contrast, the percentage of students writing SSMs or other assignments, preparing posters or presentations and writing up clinical cases little or some of the time was very low.

Do medical students think that a tablet or laptop best suits their learning needs and why?

Students were asked whether they recommended that Lancaster Medical School (LMS) buy new students laptops, as in previous years, or tablets. Overall, sixty-eight per cent (n=92/135) of the students recommended that students should be supplied with laptops. The recommendation of whether to provide a laptop or tablet was not related to the year of study (Fisher's exact test p=0.942).

Table 3: Recommendation for provision of laptops or tablets in relation to year of study

Recommendation	Year of study				Overall	p=
	1	2	3	4		
Laptop	29 (69.0%)	25 (69.4%)	27 (64.3%)	11 (73.3%)	92 (68.1%)	0.942
Tablet	13 (31.0%)	11 (30.6%)	15 (35.7%)	4 (26.7%)	43 (31.9%)	

Does the ownership of a tablet or smartphone influence students' attitudes to whether a tablet or laptop best suits their learning needs?

It was considered possible that students who own a tablet, and thus have potentially used it to support their learning, might recommend the provision of tablets or laptops differently than those who do not own a tablet.

Laptops were recommended by 69.4% (n=25/36) of students who own a tablet, and 67.7% (n=67/99) of students who do not own a tablet. There was no significant difference in the recommendation of whether to provide laptops or tablets between students who own a tablet and those who did not (Figure 3, Fisher's exact test p=0.942).

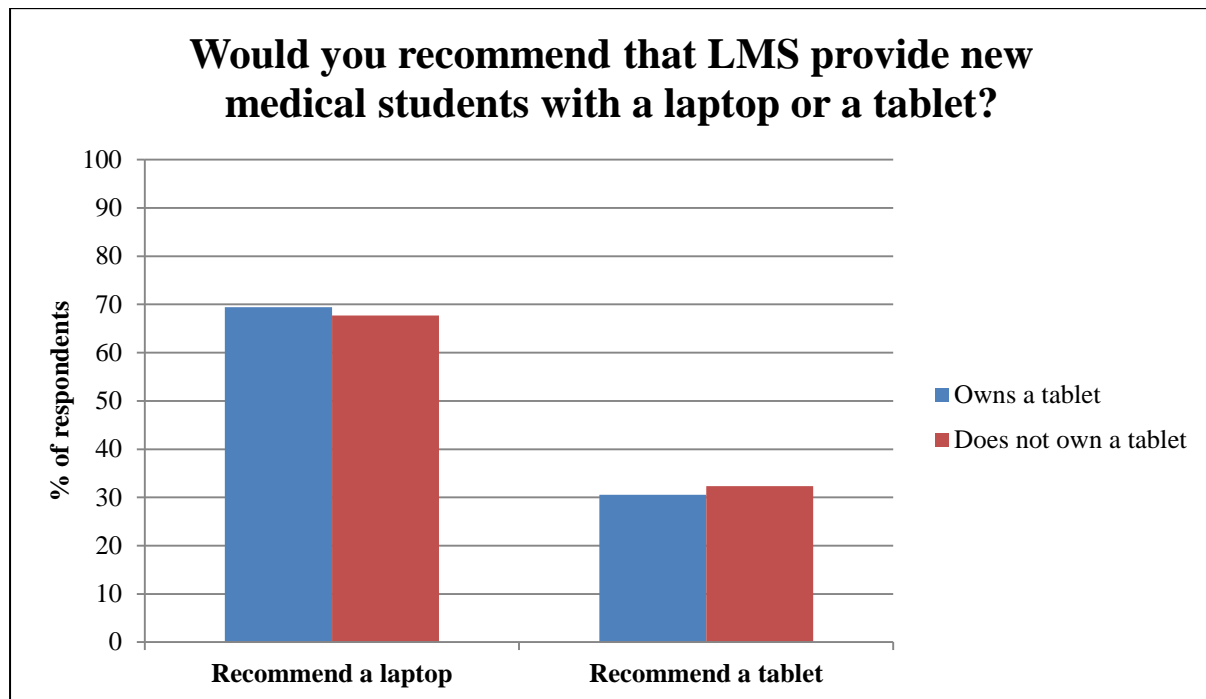


Figure 3: Recommendation for provision of laptop or tablet based on tablet ownership

As smartphones share some of the features of a tablet, there was a potential that owners of smartphones may differ from those who don't own a smartphone in their recommendation of provision of a laptop or tablet.

Of smartphone owners, 68.1% (n=77/113) recommended provision of a laptop as did 68.2% (n=15/22) of students who do not own a smartphone. There was no significant difference in the recommendation to provide laptops or tablets between students who own a smartphone and those who did not (Figure 4, Fisher's exact test p=1.000).

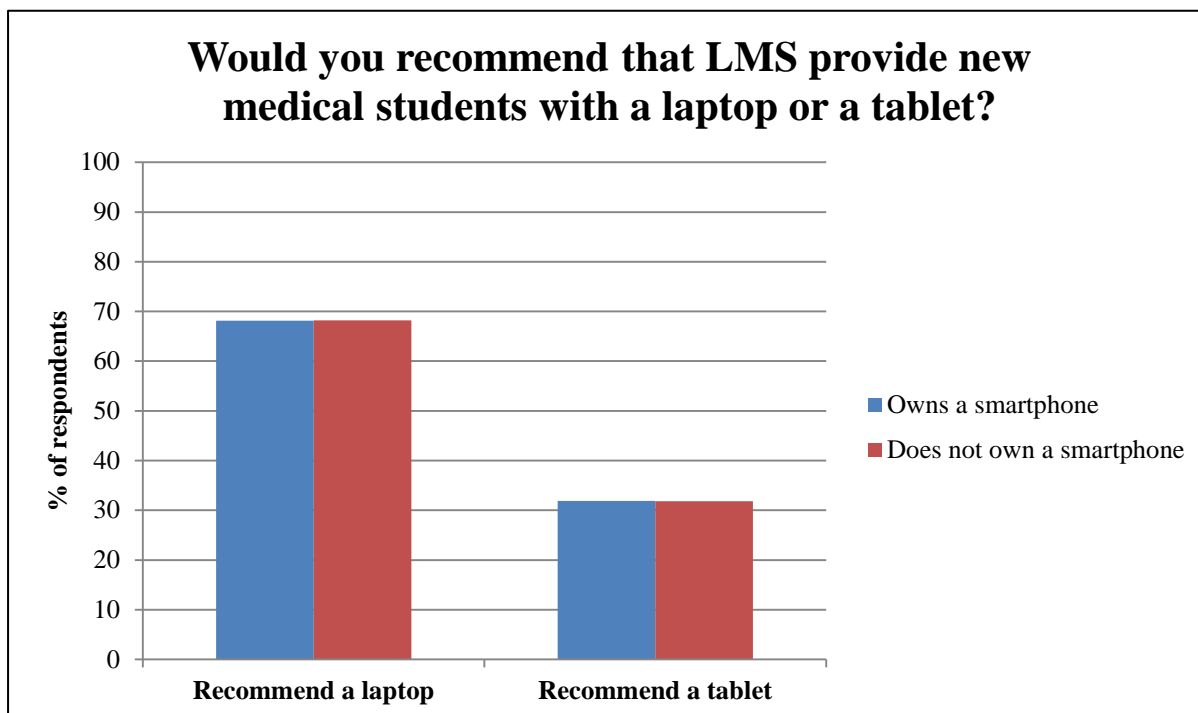


Figure 4: Recommendation for provision of laptop or tablet based on smartphone ownership

Qualitative data

Given the results above, the qualitative data has been briefly reviewed to demonstrate the kinds of comments which when systematically analysed may shed light on the quantitative findings. As shown above, students were asked whether they would recommend that new medical students were provided with a laptop or tablet. For speed and simplicity, responses to the open questions have been conflated in this review regardless of whether they already own a tablet or smartphone. These differences will be brought out in the full analysis and presented at the conference.

Tentative findings suggest that the students who prefer that the Lancaster Medical School continue to provide a laptop rather than a tablet computer (68.1%, n=92/135) cite reasons such as the greater capabilities of laptops for supporting their studies. The reasons they give include that tablets are not as flexible as laptops, software is limited and 'not designed for work'; laptops have more storage; tablets are luxury items; laptops are easier to use and more 'ergonomic'; laptops have larger screens therefore cause less eyestrain; touchscreens can be slow and so on. This quote from one of the students encapsulates the kinds of views that many of the students express:

"A tablet is not something that I personally see as a work device. I see tablets as being rather gimmicky and underpowered which is poor when you take into account the cost that they demand to purchase one. They also appear to me to be more recreational based. A laptop is just as mobile as a tablet, and can be far more powerful and capable of carrying out work for a lower cost. Also as far as I am aware, EndNote does not have an android app and only has an IOS app, meaning that the medical school will have to purchase 50 ipads for students just so they can carry out their SSMs. Apple are notorious for overpricing their rather underpowered tablets. Summary: Laptops are cheaper, more work oriented and more powerful. To me tablets are recreational devices, not suitable for proper work and much less powerful compared to the higher cost that they demand, especially ipads."

In contrast, and drawing on the quantitative results, 31.9% (n=43/135) of the students argued that having a tablet rather than a laptop would be beneficial for a number of reasons. Responses to the open questions showed that their answers were often based on the rationale that most students would arrive at university already equipped with a laptop. This being so, the students contend that tablets would be more portable (possibly to be taken on

the ward); have many useful medical related apps; are a 'great educational tool'; are helpful for reading journal articles and books and more 'modern, fast and light'. Many of these ideas are summarised in the following quote from one of the students:

"This is the future. In terms of development, a laptop does most of the useful things a computer does. That's why we get laptops and not computers. Now, the tablet is performing most of the tasks a laptop can do, more so the tasks we require. So why give a laptop, when you can give a tablet. I say tablet, but an iPad would be ideal. As medical students we need to remain awesome, and it's fair to say that iPads look pretty awesome. But on a serious note, I strongly suggest an iPad along with endnote software for personal computers. I say this from mine, and others' experience in that my uni laptop spends most of its student life collecting dust. I feel I neglect the poor thing sometimes. An iPad would be close to me at all times."

The above quote suggests a particularly personal response to having a mobile device. Nevertheless, the content in terms of why a tablet could be more useful than a laptop – or used alongside a laptop – is striking.

This data needs to be carefully and systematically analysed to provide reliable findings. Nevertheless, these examples show how useful the data will be for shedding light on the quantitative findings.

Conclusions

As noted above, this study is currently in progress. The literature review will be written and the qualitative data will be analysed by the point of the conference. These will be brought together with the quantitative findings to produce results in time to receive feedback at the conference.

Ownership of smartphones is not ubiquitous in medical students at Lancaster University and only just over a quarter of students own a tablet. Many of those who own a tablet used them to support their learning, however mainly for 'read-only' tasks. Few students use their tablets for written tasks, particularly lengthy documents. This suggests two possibilities: that the affordances of tablets do not support these written tasks; or that students lack the digital literacies, including adaptability, necessary to best utilise these devices. Further research is required to investigate this uncertainty.

Smartphones are primarily seen as having a social function and far fewer students use them for learning. A common finding was the use of apps to support learning. Overall, the findings show that students are not a homogenous group in relation to their use of these technologies for learning, as similarly found by The Net Generation project (Jones, 2010).

Despite positive reports about the value of tablets in medical education, Lancaster medical students appear to want something different. Many are convinced that they need a laptop with appropriate software. The data suggests that at least some may not have the material resources to provide their own. Given that some students don't have laptops when they arrive, the data suggests that their provision is something of a leveller. It is not clear whether other medical schools which supply tablets have students with the resources to also supply their own laptop, or whether the tablet is the only device used to support learning.

Mobility and convenience were considered to be an important factor for those students who would prefer provision of a tablet.

Ownership of a tablet or smartphone did not influence the preference for provision of a laptop or tablet. However, the results from those owning a smart phone and particularly from those owning a tablet suggest they are not making the uses of it that they could. For example, students appear to assume that they cannot write reports on the tablet despite the availability of keyboard docks to improve the ergonomics of such a task. There also seems to be a reticence to investigate and purchase word processing, referencing and other applications which may extend the features of a tablet. Perhaps this calls into question the assumption that today's university students already possess certain levels of digital literacy. How far do lecturers need to scaffold learning for medical students with tablets and smartphones?

References

- Comstock, J. (2013). iPad-equipped medical school class scores 23 percent higher on exams. Retrieved 8th October, 2013, from <http://mobihealthnews.com/20311/ipad-equipped-medical-school-class-scores-23-percent-higher-on-exams/>
- Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies? *ALT-J*, 12(2), 113-124.
- Coughlan, S. (2010). University gives students text books on iPhones. Retrieved 8th October, 2013, from <http://www.bbc.co.uk/news/education-11427317>
- Donlan, B. (2011). Nine medical schools that support mobile learning. Retrieved 8th October, 2013, from <http://mobihealthnews.com/12346/nine-medical-schools-that-support-mobile-learning/>
- George, P., Dumenco, L., Dollase, R., Taylor, J. S., Wald, H. S., & Reis, S. P. (2013). Introducing technology into medical education: Two pilot studies. *Patient Education and Counseling*(In press). doi: <http://dx.doi.org/10.1016/j.pec.2013.04.018>
- IBM Corp. (Released 2012). IBM SPSS Statistics for Windows. (Version 21.0). Armonk, NY: IBM Corp.
- JISC. (2013). Developing digital literacies Retrieved 14th January, 2014, from <http://www.jisc.ac.uk/whatwedo/programmes/elearning/developingdigitalliteracies.aspx>
- Jones, C. (2010). The Net Generation encountering elearning at University ESRC End of Award Report, RES-062-23-0971. Swindon: ESRC.
- Mathis, J. (2011). Yale gives iPads to med school students. Retrieved 8th October, 2013, from http://www.macworld.com/article/1162076/yale_gives_ipads_to_med_school_students.html
- Parchoma, G. (in press). The contested ontology of affordances: Implications for researching technological affordances. . *Computers in Human Behavior*.
- Payne, K. F. B., Wharrad, H., & Watts, K. (2012). Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. *BMC Medical Informatics and Decision Making*, 12(1), 121.
- Robinson, R., & Burk, M. (2013). Tablet Computer Use by Medical Students in the United States. *Journal of Medical Systems*, 37(4), 1-4. doi: 10.1007/s10916-013-9959-y
- Strauss, A. (1987). *Qualitative analysis for social scientists*. . Cambridge: Cambridge University Press.
- SurveyMonkey. (2013). SurveyMonkey. Retrieved 8th October, 2013, from <https://www.surveymonkey.com/>

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