Exploring Medical Students' Use of Technology

Linda Corrin
Graduate School of Medicine
University of Wollongong

The use of Information and Communication Technologies (ICTs) are increasingly important in the delivery of medical education. Whilst the primary motivation for technology integration is to increase learning and teaching effectiveness, such decisions are sometimes based on assumptions of a high level of technological literacy of students entering higher education. Recent literature has challenged these assumptions instead presenting a more diverse picture of students' experience and skill with technology (Kennedy et. al., 2007, Oliver & Goerke, 2007; Margaryan, Littlejohn & Vojt, 2011). This paper presents the results of surveys conducted with new graduate medical students designed to measure access to and confidence with technology. This data has been used by the medical school to monitor the technological profile of each cohort of students in order to implement suitable support activities and to provide an empirical foundation to inform decisions around the implementation of new educational technologies in the curriculum.

Keywords: Medical education, Technology, Digital Natives, Net Generation

Introduction

As medical curricular become more innovative, incorporating a diverse array of learning and teaching activities delivered across campus, clinical and community environments, information and communication technologies are increasingly being used to support delivery. As integration of technology has increased it has become clear that more understanding of students' technology access and use is required to make sure technology is utilised effectively. By providing empirical evidence of students' experience, confidence and access to technology, reliance on the use of generalisations based on the supposed technological attributes of members of this generation of students can be reduced. Such generalisations have been used by some to call for radical change to education to incorporate higher levels of technology (Oblinger & Oblinger, 2005), however others caution that more evidence is needed before change should be considered (Helsper & Eynon, 2007, Bennett, Maton & Kervin, 2008). The discussion around the so-called "digital natives" (Prensky, 2001) or the "Net Generation" (Tapscott, 1998) claim that today's students have grown up surrounded by technology, and therefore would be comfortable with an increase in the use of technology to deliver education.

Studies that have emerged over the past few years have begun to challenge these assumptions and have demonstrated that a significant level of diversity exists in the technological aptitude of the current generation of students (Kennedy et. al., 2007, Oliver & Goerke, 2007; Margaryan, Littlejohn & Vojt, 2011). In terms of

medical students, Dorup (2004) found that whilst access and use of technology was increasing over time, not all students wanted an increase use of technology in their studies. Dorup also stressed the importance of building in suitable technology support activities to address the varying levels of ICT literacy. McNulty et. al. (2002) found that medical students' personality has an impact on their use of technology accounting for some of the variation in adoption of technologies.

This paper explores the technology access, use and confidence of medical students entering a new graduate medical programme. Five years of data are presented which show that not all students demonstrate a high level of technology engagement and there is a significant variance in some technology-based activities. This data has been used by the medical school to inform the development of technology support activities and the implementation of new technology in the curriculum. The data provides valuable justification for choices around educational technology and is useful when exploring technological solutions to pedagogic problems.

Background to the medical school

Established in 2006, the Graduate School of Medicine (GSM) at the University of Wollongong offers a four-year graduate medical programme. A strong emphasis of the programme is the development of medical practitioners for regional, rural and remote Australia to help address the shortage of doctors in these areas. The curriculum is integrated and spiral in nature designed around 93 clinical presentations and four themes of learning outcomes: Medical Sciences, Clinical Competencies, Personal and Professional Development, and Research and Critical Analysis. Rather than discrete subjects on each medical discipline (ie. Paediatrics, pathology, etc.), the curriculum develops scientific and clinical knowledge through problem-based learning, body system blocks of teaching, and clinical experience. Students begin their first clinical placements at the end of the first six weeks of the programme and continue clinical placements throughout each of the four phases of the course. The first 18 months (Phase 1) of the course is primarily campus-based, but in each of the other phases the time on campus is minimal with most of the students' time being on clinical placement. In Phase 2 students undertake clinical specialty rotations in the five areas of Medicine, Surgery, Paediatrics, Maternal and Women's Health, and Mental Health. Phase 3 consists of a12 month longitudinal placement in a regional or rural area where students divide their time between general practice, hospital and community clinics. The fourth Phase involves a six week pre-Internship term (usually taken in NSW), a six-week selective term (usually taken somewhere in Australia), and a six-week elective term (can be taken anywhere in the world).

Due to the diverse nature of the curriculum and dispersed locations of the students for the majority of the programme, technology has been used extensively to deliver various elements of the programme. Course content is tagged and stored in a learning content management system (Equella) and delivered to student via a learning management system (Blackboard Vista). The structure of these two systems allows students to access and search all learning outlines and resources delivered to their cohort to date. Each learning activity has an associated outline stored in Equella which sets out the elements of the learning activity including learning outcomes, pre-readings, and associated resources (lecture notes, lecture audio, etc.). The learning activity outlines are also tagged with the associated clinical presentation (from the list of 93), body system, clinical competence, medical science, etc. The GSM also delivers material in the form of Guided Online Assessable Learning (GOALS) objects which are interactive activities that support other elements of the course.

Several tools in the learning management system are also utilized extensively throughout the programme including the quiz tool, assignment submission tool, discussion forums and calendar. The school also makes use of technologies in the classroom including audience response systems (clickers) and video conferencing. The medical degree is taught across two campuses in Phase 1, 6 locations in Phase 2, and across 10 locations in Phase 3, which means that a majority of learning sessions are video conferenced. Another piece of technology integral to the curriculum is the Clinical Log. The Clinical log is a web-based tool designed to allow students to record and reflect on their experiences with patients. The Clinical Log allows students to map their experiences back to the curriculum and looks for any gaps which may need addressing.

In order for students to engage with all of these technologies it is necessary for them to have a reasonable level of technology literacy. As the use of technology in the curriculum increases awareness of the support students may need to gain the necessary literacy has become an important consideration. Surveys such as the one carried out in this study hope to provide timely and relevant data to assist with planning support activities and implementing new technologies.

Methodology

A technology survey has been administered at the start of the year for each new cohort of students since 2007. The purpose of the survey is to profile students' access to and confidence with technology. This data is then used to determine technology support and training requirements for students and to inform new technological innovations in teaching and learning.

The survey has developed over the past five years. Consistent to each year are the demographic questions of age and gender, type of Internet connection, learning management system the students have used in their previous studies and their confidence levels (on a scale of 1 to 7) in relation to using the Internet, email, word processing software, presentation software and audiovisual equipment. In 2009 the survey was expanded to include additional demographics, access/ownership levels of communication devices, frequency of technology-based activities (i.e. online banking, gaming, etc.) and social networking engagement. The categories of technology use for which students were asked to indicate their confidence were also expanded to include more university-related activities such as accessing library resources online, participating in online discussion forums and using statistical software for research. Furthermore, in 2010 questions were added to ask students the operating systems they use on their personal computer. In 2011 questions were added to assist with the planned introduction of podcasting (i.e. identification of students' preferred podcasting software).

Results

The results of the technology surveys over the past five years have shown a steady increase in access to and confidence with technology; however at the same time demonstrate that there remains a variance in individual student's technology access and use. Figure 1 demonstrates that access or ownership of computers has seen an upward trend in students adopting the portable laptop option.

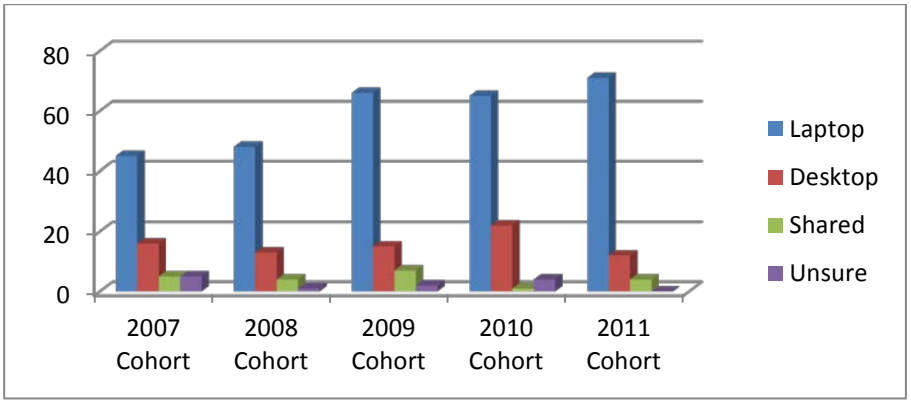

Figure 1: Computer Ownership (2007 – 2011)

Another area that impacts the delivery of the curriculum is the speed at which students can access learning materials. As online learning resources become more interactive and incorporate more audio and visual elements access to Broadband becomes critical. Figure 2 shows that Broadband Internet adoption has increased over the five years with virtually no students left on slower dialup connections.

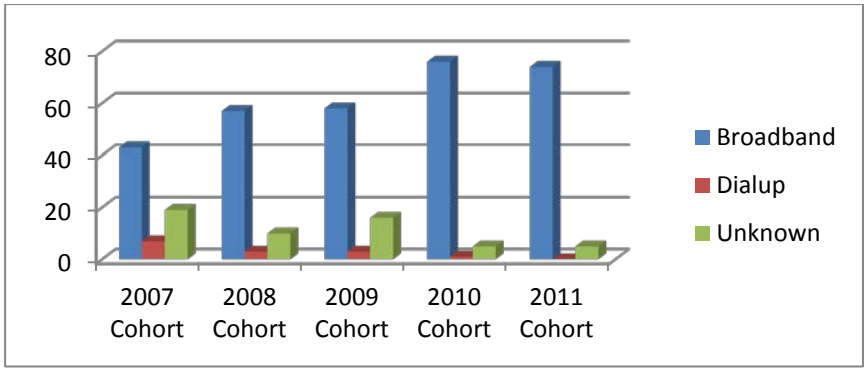

Figure 2: Internet Connection (2007 – 2011)

The rates of confidence with technology showed very little difference from year to year. The figure below shows the results for use of Internet, word processing software, spreadsheet software, presentation software and audio visual equipment as well as an overall rating for confidence with computer skills. Only results from years 2009 to 2011 are presented on this chart as the results for 2007 and 2008 were on a 10-point scale instead of 7. The low levels of confidence with audio-visual technologies are an example of an area that needs to be addressed with further support activities. As so much of the curriculum is delivered via this method, it is important that students are comfortable with its use and able to operate the equipment if required. As a result, video conferencing training sessions are now being run by the faculty's Educational Technology Officer.

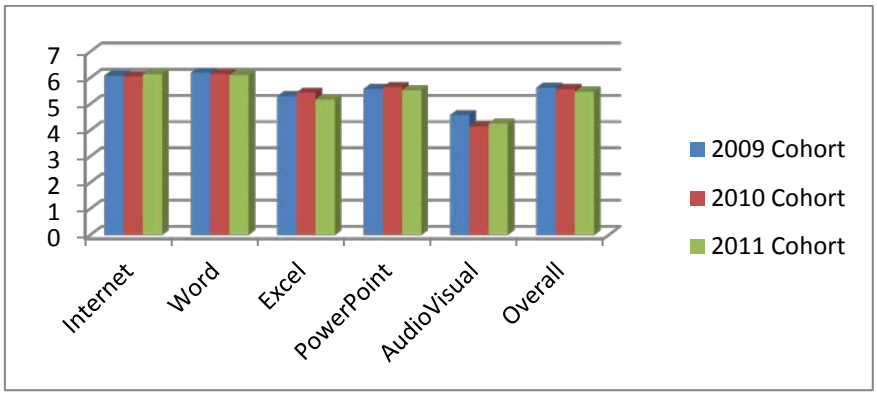

Figure 3: Confidence with technology (2009 – 2011)

Social networking is an area which has shown variance in student engagement. The surveys have shown that social networking has not been unanimously adopted by medical students with 10% of the 2009 cohort, 16% of the 2010 cohort and 11% of 2011 cohort students not accessing social networking at all. In the most recent cohort (2011), 67% of those students that use social networking sites access them daily, 23% weekly and 10% occasionally. These findings are consistent with recent studies which observed many differences in the way students use social software (Valtonen, Dillon, Kacklin & Vaisanen, 2011).

In relation to mobile devices, there have been a number of suggestions made by staff and students for the creation of an iPhone application for systems such as the Clinical Log. However, the mobile phone ownership statistics show that although all students had access to a mobile, only 25% of students owned an iPhone in 2010. Whilst this number grew to 38% in 2011 this still represents less than half of the students in the cohort.

Knowledge of these trends has prompted the Educational Technology team to explore other options for mobile application development including platform-independent options such as HTML5.

Conclusion

The wide variety of technologies incorporated into the medical curriculum creates many opportunities for the delivery of quality education. The use of regular surveying of students to gauge levels technology access and use has proven very useful to the GSM in determining how to maximise and support technology use in the delivery of the curriculum. Orientation to the educational technology elements of the courses is adapted each year based on the results of these surveys and specific student training has been introduced at certain points within the course (i.e. video conferencing training, orientation to the use of the Clinical Log, etc.). Whilst the levels of technology engagement are fairly high across the cohorts, variance still exists in relation to some technological activities (i.e. social networking) and confidence in relation to core delivery technologies (i.e. audio visual technologies). These factors need to be considered when new technologies are introduced and sufficient support resources need to be made available to those students who may need them. Surveying each new cohort will continue in the future with the surveys being adapted to include investigation of new trends and technologies (ie. tablets). In the future it is hoped that the surveys can be run more regularly (i.e. yearly) with each cohort to track and adapt to changes in technology adoption over the four years of the MBBS programme.

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Author contact details:
Linda Corrin lcorrin@uow.edu.au

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