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A Peer Reviewed International Journal for the Advancement of Clinical Skills
- *'docendo ac discendo' - 'by teaching and learning'*



In this issue:

The ophthalmic surgical simulator

Managing trainee doctors experiencing difficulty

Educational impact of Direct Observed Procedural Skills (DOPS)

Clinical education on the move

Examination of the patient with a brainstem lesion

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Our sincere gratitude for the kind support from Sir Liam Donaldson, the Chief Medical Officer for England, United Kingdom.

The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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Foreword

A Message from the Chief Medical Officer for England, United Kingdom



The systematic and safe acquisition of high quality clinical skills is an essential part of modern medical training as highlighted in my Annual Report published in March 2009. I wish the International Journal of Clinical Skills every success in highlighting research and knowledge in this important area.

A handwritten signature in blue ink, appearing to read 'L. Donaldson', written in a cursive style.

Sir Liam Donaldson
The Chief Medical Officer for England

Clinical education on the move: a survey of medical students' experiences of m-learning

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Abstract

Objective: mobile learning or 'm-learning' can allow contextual learning that is not restricted by location. The objective of this paper is to assess firstly the ownership of mobile technologies and secondly the experiences and attitudes towards m-learning, in a cohort of medical students during the clinical component of their training.

Methods: an online questionnaire was developed to capture medical students': 1) general demographic details, 2) ownership of portable electronic devices, 3) use of such devices, 4) experiences of such technologies in the clinical component of their studies and 5) perceived educational effectiveness of different downloadable media. The questionnaire was distributed to all medical students in the clinical years of the medical degree programme (n=498) at Queen's University Belfast (Northern Ireland). Participants' responses were rated on Likert scales.

Results: the response rate was 60% (298/498). The majority of students reported to own mobile electronic devices and use them frequently during a variety of day-to-day activities. Usage of devices most commonly occurred during commuting. Responses indicated that music files were the most popular file type. Students tended not to use their mobile device for educational purposes and felt suitable educational files were not widely accessible. If such files were more accessible, students appeared keen to use them in their learning. Of all the different file types, students tended to favour more visually intensive mediums, such as clinical examination and procedural videos.

Conclusion: medical students appear to be no different from other similarly aged individuals, in terms of their usage and enthusiasm for using mobile technologies. Not only do they widely use such devices in their leisure time, they also express keenness and a desire to utilise m-learning in their clinical studies. Where such technology has the potential of delivering contextual learning in the clinical environment, a lack of suitable educational material appears to be a limiting factor. As educators we need to embrace this method of teaching and extend the provision of learning material into this arena; however, any developments need to be underpinned by educational theory, rather than technological novelty.

Introduction

In recent times there has been a significant advancement in the use of technology for medical education. Most medical schools now have integrated e-learning environments in their degree programme [1]. As recognised by the UK General Medical Council (GMC), there has never been a time where students' ability to use such technologies has been so vital [2]. As a society there has been an increasing trend in the use of mobile electronic devices, such as mobile phones

and portable media players, especially among the younger generation of our population [3]. This change has accompanied a rapid improvement in mobile technologies, with sophisticated capabilities such as wireless networking now commonplace [4].

Mobile learning or 'm-learning' can allow contextual learning that is not restricted by location. For medical students training in the clinical component of their studies, m-learning has the potential to facilitate location based learning in the clinical environment. This is of particular significance given the typically wide geographical distribution of clinical attachments in healthcare education. Whilst the use of m-learning is not new in education, there is a limited evidence base on which to back the use of such technology for undergraduate medical education [5]. To this end, educationalists have been encouraged to evaluate and report the use of m-learning in medical education [5].

The aim of this study is to assess in a cohort of medical students during the clinical component of their training, (1) ownership of mobile technologies and (2) experiences and attitudes towards m-learning.

Methods

The study was conducted in the School of Medicine, Dentistry and Biomedical Sciences at Queen's University Belfast (Northern Ireland). The undergraduate medical programme follows a five year integrated spiralling curriculum model, with clinical training focusing in years three, four and five. The curriculum is delivered in a blended approach including large and small group teaching, clinical attachments, practical sessions in a clinical skills centre and e-learning. Since 2004, students have had access to a range of teaching materials produced by the institution that can be accessed remotely. These include online text, videos and audio files. It is assumed that students also had access to other unrestricted m-learning materials available on the World Wide Web.

An online self administered questionnaire was developed by a focus group of medical educationalists, clinical teachers and medical students following a review of the literature. The questionnaire aimed to capture medical students':

1. General demographics (sex and age)
2. Ownership of portable electronic devices
3. Use of such devices
4. Experiences of such technologies in their clinical component of their medical degree programme
5. Perceived educational effectiveness of downloadable media

The questionnaire was piloted on a sample of medical students and then sent by e-mail to all medical students in the clinical years of the medical degree programme (n=498). A reminder e-mail was sent after 4 weeks. Participants' responses were rated on Likert scales. Simple descriptive statistics were used to analyse the data using SPSS 15.0 software (SPSS Inc., Chicago, Illinois). Ethical approval was obtained from the Schools' Ethical Committee.

Results

Two hundred and ninety eight responses were received giving a response rate of 60% (298/498).

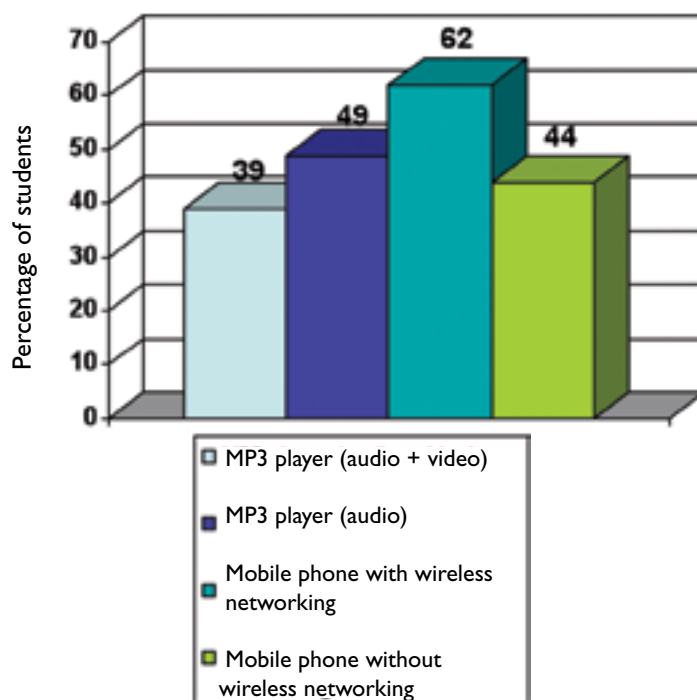
Respondents' characteristics

The age of respondents ranged from 20-30 years of age, with a mean age of 22 years. 60% (178/298) of respondents were female and 40% (120/298) male. The sex distribution was comparable to the central university records of students in the sample population (57% (284/498) female and 43% (214/498) male).

Ownership of portable technologies

All students reported owning a mobile phone. 62% (186/298) had a mobile phone with wireless networking capabilities. 39% (116/298) reported having an MP3 player that could play audio and video files, with 49% (145/298) having an MP3 player that could play audio files only (Figure 1).

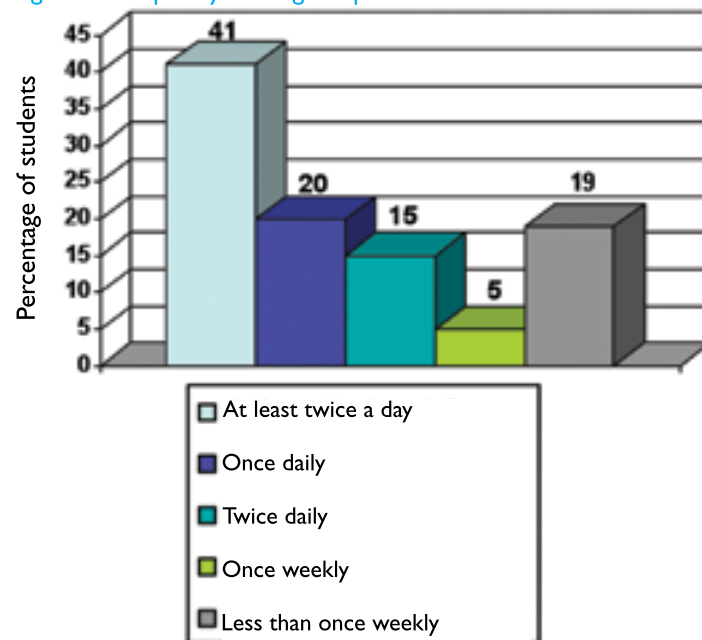
Figure 1: Ownership of portable technologies



Use of portable technologies

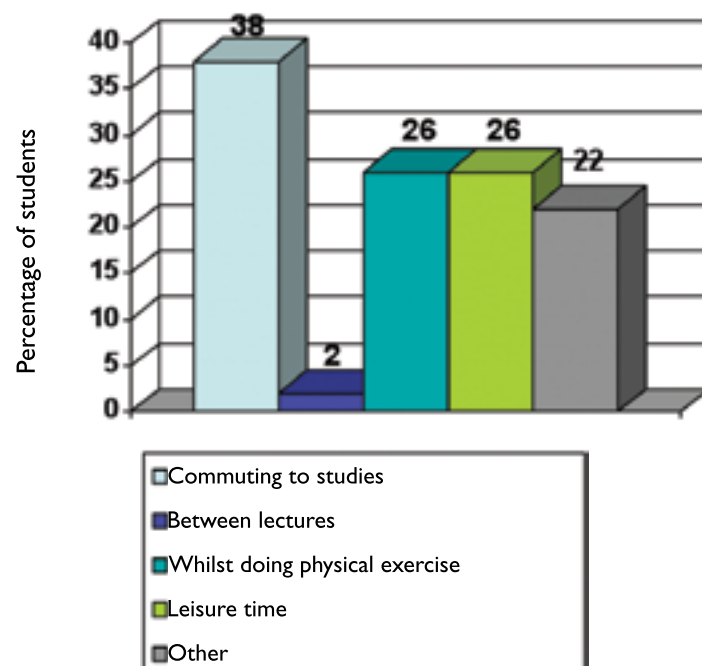
Students were asked to report on the general usage of their mobile devices (Figure 2). 41% (114/277) of students who responded to this question reported using their mobile device greater than twice daily. 20% (56/277) use their device once daily; 15% (42/277) twice weekly; 5% (13/277) once weekly; and 19% (52/277) less than once per week.

Figure 2: Frequency of usage of portable devices



Students were asked when they were most likely to use their mobile device (Figure 3). Of the 286 students who responded to this question, 38% (110/286) most often use their device when commuting to their place of study. 2% (6/286) reported using their devices between lectures; 26% (75/286) while partaking in exercise; 26% (73/286) during personal leisure time; and 8% (22/286) during other activities.

Figure 3: Activities during which devices are most likely to be used



Students were asked what type of files they would tend to either download or transfer onto their mobile device (Table 1). Responses indicated that music files were the most popular file type. Students were less likely to use educational files on their mobile device, particularly video files. Students were asked to respond to several statements regarding the use of m-learning in their clinical training. Responses are outlined in Table 2. Students were also asked to respond to the perceived usefulness of different educational file types in their clinical training. Responses are outlined in Table 3.

Table 1: Types of files that respondents are most likely to download or transfer to their mobile device

File type	Student responses on 4 point Likert scale				Mean response
	Regularly (1)	Often (2)	Occasionally (3)	Never (4)	
Music files	107	89	56	39	2.1
Leisure webcasts	18	44	53	168	3.3
Educational webcasts	9	35	63	180	3.4
Leisure videos	14	39	62	170	3.4
Educational videos	7	27	70	183	3.5

Table 2: Students' responses to statements about m-learning (in their clinical training)

Statements	Student responses on 5 point Likert scale					Mean response
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	
'I regularly use my mobile device for educational purposes'	8	31	41	102	105	3.9
'Downloadable or transferable educational files are widely accessible'	8	32	72	99	76	3.7
'If educational files were more accessible I would be inclined to transfer more onto my mobile device'	71	136	52	17	14	2.2
'If I came across a useful educational file, I would be inclined to share it with my medical student colleagues'	104	138	29	10	8	1.9
'I would be keen to record my own audio, image and / or video files to contribute to my reflective portfolio'	32	46	102	64	40	3.1

Table 3: Students' responses to the perceived usefulness of different mobile educational file types (in their clinical training)

	Student responses on 5 point Likert scale					Mean response
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	
'The following mobile educational file types are useful in my clinical training:'						
Audio lectures	18	105	90	54	21	2.8
Video lectures	47	133	65	27	13	2.4
Audio files of heart sounds	147	127	8	6	1	1.6
Clinical examination videos	194	87	6	1	1	1.4
Procedural videos	177	100	10	1	1	1.4
Audio self assessment files	33	89	123	33	10	2.6
Video x-ray tutorials	108	114	61	2	3	1.9

Discussion

The results of our study suggest that medical students own electronic devices that are capable of facilitating m-learning and that they would be willing to use these devices for this purpose. In keeping with other similarly aged members of society, medical students appear no different in their ownership and usage of portable electronic devices, especially mobile phones [6]. It is evident that students have integrated such technologies into their day-to-day lives, but not with their clinical studies. Where m-learning has the potential for enhancing clinical learning, by providing situation based education in the clinical environment, it is under-utilised by medical students. This is largely due to a paucity of available material. Ownership and student enthusiasm do not appear to be barriers to such learning, but it could be argued that as educators and curriculum developers, we may be 'late adopters' to the integration of such technology in clinical education. This cohort of medical students expressed a need for more clinical m-learning teaching material and if the provision of such quality material was made, they would be more inclined to use such technology during their clinical training.

E-learning has the potential to facilitate collaborative learning over a wide geographical location. One clear advantage of m-learning over e-learning is that students are not restricted to accessing a computer, when they want to learn and share with each other. Developing such a learning community, by means of m-learning, appears to be widely supported by the respondents to our survey; and as educators our attention should be targeted on these needs. Perhaps the greatest challenge in providing these resources is the time and financial investment required to provide the material in a multitude of formats. This is particularly relevant given the speed at which mobile technologies are developing. Despite structured teaching programmes, opportunistic learning still has a place in clinical training. In these instances, m-learning has the potential to supplement and enhance such learning. For example, when an opportunity arises for a student to perform an arterial blood gas sample they have the chance to review a video sequence of how to perform the skill prior to and after undertaking it. Equally, reading up about a condition at ward level after examining a patient allows 'hot reviewing', facilitating the embedding of such knowledge.

With increasing levels of student anxiety and stress, it is important to acknowledge that students need to have protected 'down time' from their studies [7]. It could be an over simplistic view that students could utilise such learning files during their recreational time. Protecting students against the demands of a medical degree course needs to be considered, with the potential of allowing studies to erode into leisure time.

Of all the different types of downloadable or transferable mediums, students appear to value visually intense files such as clinical or procedural videos. It could be argued that in clinical learning, there is a greater demand on students' psychomotor skills particularly regarding examination and procedural abilities. Having a video of such skills could provide the learner with a realistic review of how to perform each skill in the clinical environment, rather than by reading a descriptive account.

The clinical encounter is at the heart of clinical skills learning. Any new mode of learning in the clinical environment should not distract from patient contact. As with e-learning, m-learning should be considered in a 'blended approach' to learning. Where there is concern that e-learning has the potential to encourage 'learner isolation', m-learning may go some way to bring learning out of the computer suite and into the clinical arena.

Limitations of our study include the validity of our questionnaire. Our questionnaire was designed and piloted by medical educationalists, clinical teachers and students, and then reviewed by faculty for face validity. However, it is a new questionnaire and has not been validated by prior research. While we achieved an adequate response rate, our sample only represented a cohort of medical students during the clinical training of their studies. Our results may not be generalizable due to variation in medical schools' curricula and student demographics. Furthermore, the questionnaire focused on the impact of m-learning on course content rather than course administration. Potentially, m-learning has a lot to offer regarding course administration, for example, timetabling and reminders about assessment. However this questionnaire did not explore these functions. Finally, the questionnaire was delivered to the target cohort via e-mail. It might be suggested that respondents were more likely to be technically minded than non-respondents, and that this might affect device ownership and usage. However, all students in the institution are encouraged to check e-mail regularly since this is the main method of communication of course information.

Conclusion

Medical students appear to be no different from other similarly aged individuals in terms of their usage and enthusiasm for using mobile technologies. Not only do medical students widely use such devices in their leisure time, they also express a keenness and desire to utilise m-learning in their clinical studies. Where such technology has the potential of delivering contextual learning in the clinical environment, a lack of suitable educational material appears to be a limiting factor. As educators we need to embrace this method of teaching and extend the provision of learning material into this arena. However, any developments need to be underpinned by educational theory, rather than technological novelty.

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