

## Computer Aided Learning Knowledge among Medical Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

MS Sherina, A Mohd Yunus, SA Azlan Hamzah & MZ Azhar

*Department of Community Health, Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia*

### ABSTRACT

Computer proficiency has become necessary in many areas of medicine, administration, clinical practices, research, as well as education. The need for greater competence in information and communication technologies (ICT) by doctors and medical students is increasingly recognised. **Objectives:** This study was undertaken to determine the knowledge, attitude and practices on ICT in the medical students of a local university. **Methods:** A cross-sectional descriptive study was conducted among medical students (Years 1-5) from December 2005 to May 2006 in Universiti Putra Malaysia. A self-administered questionnaire was used to collect data. Descriptive statistics were used to obtain frequencies for all variables studied. **Results:** There were 343 respondents aged 18-29 years old. The results showed 82.2% of the respondents (82.2%) were comfortable using computers after entering medical school and 89.2% believed that ICT and computers skills are important for doctors. About 81.3% of the respondents were aware of the role of ICT and computers in learning medicine, 90.4% had used presentation packages, and 83.4% used word processing and search engines as software tools. **Conclusion:** The findings of this study show that medical students are knowledgeable and do have skills in information technology (IT) and computers. They are also aware of the role of information technology (IT) and computers in medicine.

**Keywords:** Computer aided learning, information and communication technologies (ICT), medical education, medical students

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### INTRODUCTION

In the current era of globalisation, growth in the variety of resource formats and dispersion of information has had a compounding effect on the skills demanded of academic students. It has become increasingly important for medical students, who have chosen a profession which requires life-long ethics learning to develop an ability to seek out sources on their own and gain facilities in exploring new resources.<sup>[1]</sup> It is recognised that computer proficiency is necessary in many areas of medicine, administration, clinical practices, research and education. Efficiency, portability, consistency and effectiveness have all been cited as reasons for employing this technology in the medical school environment.<sup>[2]</sup>

The need for greater competence in information and communication technologies (ICT) by doctors and medical students is increasingly recognised. ICT applied to education has increased the scope for self-directed learning. In the United Kingdom, medical schools have found that professionals who are not computer-literate will be disadvantaged, less professionally competent and even isolated. Annual workshops are conducted for medical educators in the UK. These workshops have highlighted that students need to develop an understanding of the importance of high quality medical records, good communication, valid data collection and the use of information in the management of patients and the development of health services. At the end of the medical undergraduate course, the students should be able to demonstrate basic computing skills and its application in medicine.<sup>[3]</sup>

In the United States, medical students are given a strong grounding in the use of computer technology to manage information, support patient care decisions, select treatments and develop their abilities as lifelong learners.<sup>[2]</sup> Recent surveys among students in various medical schools in countries such as Canada, Australia and United States have found that computer-aided learning modules are effective in learning subjects such as orthopedics, pathology, parasitology and nutrition.<sup>[4,5,6,7]</sup> Matthew *et al.* found that their computer-assisted instruction was an effective tool in learning carpal bone radiograph interpretation among medical students and doctors.<sup>[4]</sup> An interactive computer-assisted learning module developed by Velan *et al.* on glomerulonephritis successfully reduced students' difficulty in learning this topic.<sup>[5]</sup> Students found that learning parasitology from a computer-based instruction was as effective as learning from a traditional lecture-based instruction, and it was also more time effective.<sup>[6]</sup> Engel *et al.* found that their computer-assisted diabetes nutrition education proved to be an efficient and effective method for teaching basic nutrition competencies to medical students.<sup>[7]</sup>

In Malaysia, the National Information Technology Council (NITC) professed the aim of using ICT to transform Malaysia into a developed nation. The National Information Technology Council developed the National Information Technology Agenda (NITA), which included 'e-learning' (learning through electronic means; such as the website, intranet or multimedia materials) to assist the development of ICT in Malaysian. In the Eighth Malaysian Plan, usage of the Internet led to growth in e-learning as a potential source of online education and training. Apart from the smart school initiative, a number of institutions of higher education provided increased opportunities for such virtual education. To ensure more coordinated and coherent development of e-learning initiatives in the public sector, a National e-Learning Consultative Committee (NeLCC) was set up to oversee the formulation of the public sector e-learning blueprint. In the Ninth Malaysian Plan (2006-2010), ICT will be harnessed as a new source of growth and wealth creation to sustain Malaysia as a competitive global multimedia hub destination to attract investments in existing and new areas.<sup>[8]</sup>

This study was undertaken to determine the knowledge, attitude and practices of computer usage in medicine among medical students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

**Table 1.** Socio-demographic profile of the respondents (n = 343)

Factors	n	%
<i>Age</i>		
18-20	116	33.8
21-23	182	53.1
24-26	39	11.4
27-29	6	1.7
<i>Sex</i>		
Male	117	34.1
Female	226	65.9
<i>Race</i>		
Malay	206	60.0
Chinese	110	32.1
Indian	16	4.7
Others	11	3.2
<i>Religion</i>		
Muslim	212	61.8
Buddhist	86	25.1
Hindu	13	3.8
Christian	26	7.6
Others	6	1.7
<i>Year of Study</i>		
Year 1	72	21.0
Year 2	89	25.9
Year 3	66	19.2
Year 4	63	18.4
Year 5	53	15.5
<i>Family monthly income</i>		
RM0-RM1000	75	21.9
RM1001-RM2000	86	25.1
RM2001-RM3000	66	19.2
RM3001-RM4000	35	10.2
RM4001-RM5000	31	9.0
RM5001 above	50	14.6
<i>Education level of father</i>		
Primary	46	13.4
Secondary	151	44.0
Tertiary	146	42.6
<i>Education level of mother</i>		
Primary	81	23.6
Secondary	161	46.9
Tertiary	101	29.4
<i>First language</i>		
Bahasa Malaysia	203	59.2
English	50	14.6
Mandarin or other Chinese dialects	84	24.5
Tamil or Tamil dialects	3	0.9
Others	3	0.9

## METHOD

This cross-sectional descriptive study was conducted among all medical students (Years 1-5) from December 2005 to May 2006 in Universiti Putra Malaysia (UPM), Selangor. A self-administered questionnaire was used to collect data. The questionnaire was divided into 4 parts:

- Part 1- Socio demographic profile (including age, sex, race, religion, year of study, family monthly income, educational level of parents and formal language used)
- Part 2 – Reported use of resources in Medical School
- Part 3 – Determination of general computer use
- Part 4 – Knowledge, Attitude and Practice of computers in medicine

For Parts 2 and 3, the students were allowed to choose more than one response/answer to each question. For Part 4, the options for the answers to each question were ‘Yes’, ‘No’ and ‘Don’t Know’.

The questionnaire was prepared in English and Bahasa Malaysia. It was pre-tested in another faculty in UPM. Data was analysed using the Statistical Package for the Social Sciences (SPSS) version 13.5. Descriptive statistics were used to obtain frequencies for all variables studied.

## RESULTS

A total of 343 of 414 medical students were included in the study, giving a response rate of 82.9%. Table 1 shows the socio-demographic profile of the students. The majority of the medical students were between 21-23 years old (53.1%), and were females (65.9%) as compared to males (34.1%).

Fifty-three percent (53.0%) of the medical students had total family monthly incomes of RM 2001 and above. The majority of the students’ fathers and mothers had at least secondary education levels, 44.0% and 46.9% respectively. The majority of the medical students used Bahasa Malaysia (59.2%) as their first language and 24.5% used Mandarin or other Chinese dialects. Only 14.6% used the English language as a first language.

Table 2 shows the reported use of resources in medical school. The resources were categorised as printed resources, human resources, electronic resources and physical evidence, and the students were allowed to choose more than one response/answer. For printed resources, most students used textbooks (93.6%) and handouts (93.0%). However, only 13.1% used journal articles. Human resources included lecturers (90.7%), other students (83.7%), patients (41.4%) and support staff (34.7%). For electronic resources, the students mainly used general search engines (85.7%) and medical web-sites (66.2%). Besides, they also used Medline search engines (39.9%) and audio-visual aids (28.3%).

Table 3 shows general computer use. The majority of medical students (78.7%) had their own computers, and about half of them have been using computers since secondary school (55.4%). Most of them use computers in the university (63.3%), Internet café (53.1%) and at home (49.6%). They usually use the computer to seek study resources (84.5%) and browsing or surfing the net (83.1%). They also use the computer for games (43.1%) and for chatting (32.4%).

**Table 2.** Resources used in medical school among the respondents (n = 343)

Factors	n	%
<i>(Respondents are allowed to choose more than 1 response / answer)</i>		
<i>Printed resources</i>		
Textbook	321	93.6
Hand-outs/ Lecture-notes	319	93.0
Journal articles	45	13.1
<i>Human resources</i>		
Lecturers	311	90.7
Other students	287	83.7
Supportive staff	119	34.7
Patients	142	41.4
<i>Electronic resources</i>		
Medical web-site	227	66.2
General search engine	294	85.7
Medline search engine	137	39.9
Audio-visual aids	97	28.3
<i>Physical evidence</i>		
Demonstration	245	71.4
Slides	249	72.6
Displays	175	51.0

Table 4 shows the knowledge, attitude and practices of computers use in medicine. About 93.0% of medical students were familiar with Information Technology (IT) and computer, and the majority (79.3%) had used IT since school days. More than 80% were comfortable using computers as a study tool and about 81.3% of the medical students were aware of the role of IT and computers in learning medicine. Two hundred and twenty-one students (64.4%) had known that medical textbooks were available on-line and 74.3% knew that medical lectures are available online. Besides, they were also aware that X-rays (67.1%) and pictures of skin diseases (79.0%) were available online, and online discussions can be conducted during tutorials.

The majority of medical students (82.2%) reported that they were more comfortable using computers today compared to before entering medical school and 89.2% believe that IT and computer skills are important for doctors. About 289 (84.3%) of medical students agreed that a medical education programme online would be useful for them. Most medical students used power point presentations (90.4%), search engines (86.6%), word processing (83.4%) and emails (72.6%) as software tools. Only half of the medical students used online databases (56.6%) and a few (38.5%) used spreadsheets as software tools.

**Table 3.** General computer use among the respondents (n = 343)

Factors	n	%
<i>(Respondents are allowed to choose more than 1 response / answer)</i>		
<i>Do you own a computer?</i>		
Yes	270	78.7
No	73	21.3
<i>How long have you used a computer ?</i>		
Since primary school	104	30.3
Since secondary school	190	55.4
After entering university	46	13.4
Never	3	0.9
<i>Where do you use the computer?</i>		
At home	170	49.6
In the university	217	63.3
Internet café	182	53.1
Friend's house	56	16.3
<i>What do you usually use the computer for?</i>		
Chatting	111	32.4
Games	148	43.1
Browsing or surfing the net	285	83.1
Study resources	290	84.5

## DISCUSSION

In tertiary medical and non-medical education, computer-aided learning (CAL) is used to replace traditional resources and has become an integral part of the teaching process. The students who use these tools have either been trained to use them at the secondary level of education or, by necessity, learn rapidly in a tertiary environment.<sup>[9]</sup>

This research showed that the majority of medical students own computers (78.7%) and have been using computers since secondary school (55.4%). In the university, most of them use computers (63.3%) and usually use the computer to seek study resources (84.5%). These findings are supported by a study done by Polyakov *et al.* on 246 medical staff at a hospital in South Australia.<sup>[9]</sup> Polyakov *et al.* found that the majority of their respondents owned computers or had access to them at work. They had been using computers for more than 10 years and believed they have a higher level of computer literacy than those who had been using computers for less than 10 years.<sup>[9]</sup> A pilot study conducted among year 4 medical students in Universiti Putra Malaysia on computer aided learning of a medical module also found that a high percentage of the respondents (92.9%) owned computers and had access to the Internet. The students were therefore able to access the module's website and participate in the online discussion forum.<sup>[10]</sup>

The majority of students in this study were already familiar with Information Technology (IT) and computers (93.0%). However, these results were not similar to the results found by

**Table 4.** Knowledge, attitude and practices of computer usage in medicine among the respondents (n = 343)

Factors	n	%
<i>Are you already familiar with Information Technology (IT) and computer?</i>		
Yes	319	93.0
No	24	7.0
Don't know	0	0.0
<i>Have you ever used IT at school?</i>		
Yes	272	79.3
No	47	13.7
Don't know	24	7.0
<i>Are you comfortable using computers as a study tool?</i>		
Yes	290	84.5
No	29	8.5
Don't know	24	7.0
<i>Are you aware of the role of IT and computers in learning medicine?</i>		
Yes	279	81.3
No	40	11.7
Don't know	24	7.0
<i>There are medical textbooks available online</i>		
Yes	221	64.4
No	58	16.9
Don't know	64	18.7
<i>There are medical lecturers available online</i>		
Yes	255	74.3
No	24	7.0
Don't know	64	18.7
<i>There are X-rays available online</i>		
Yes	230	67.1
No	50	14.6
Don't know	63	18.4
<i>There are picture of skin diseases online</i>		
Yes	271	79.0
No	9	2.6
Don't know	63	18.4
<i>Online discussions can be conducted during tutorials</i>		
Yes	193	56.3
No	87	25.4
Don't know	63	18.4

Continued

**Table 4.** Continued

<i>Are you more comfortable using computers today compared to before entering medical school?</i>		
Yes	282	82.2
No	37	10.8
Don't know	24	7.0
<i>Do you believe IT and computer skills are important for doctors?</i>		
Yes	306	89.2
No	13	3.8
Don't know	24	7.0
<i>Would a medical education programme online be useful to you?</i>		
Yes	289	84.3
No	30	8.7
Don't know	24	7.0
<i>What are the software tools that you use as a medical student? (Respondents are allowed to choose more than 1 response/answer)</i>		
Word-processing	286	83.4
Spreadsheets	132	38.5
Power Point Presentation	310	90.4
Email	249	72.6
Online databases	194	56.6
Search engines	297	86.6

McGlade *et al.* in their study on 59 students at Queen's university who took the medical informatics special study module in 1997 and 1998. Their study showed that students in the study groups declared themselves to have been less familiar with computers and IT prior to entry to medical school.<sup>[3]</sup> This is probably due to McGlade's study being conducted almost 5 years earlier than this study. Students are probably more familiar with computers and IT nowadays.

In this study, about 81.3% of the respondents were aware of the role of IT and computers in learning medicine. Most respondents (82.2%) were also more comfortable using computers after entering medical school and 89.2% believed that IT and computers skills are important for doctors. These findings are similar to the study by McGlade *et al.* which found that over 80.0% of their participants were more comfortable using computers and were more aware of the role of computers in medicine after starting medical school. The participants also believed that computer skills and information technology skills were vital to medical practitioners.<sup>[3]</sup>

The study by McGlade *et al.* also found that there was greater use of word processing and presentation packages among medical students in years 1997 and 1998.<sup>[3]</sup> Our study also showed the same pattern of results, where about 90.4% of our respondents had used presentation packages and 83.4% used word processing and in addition used search engines as their software tools. This could be due to the use of search engines becoming a trend for web surfing in comparison to the trend in 1997 and 1998.



## CONCLUSION

In conclusion, the findings of this study show that medical students are knowledgeable and comfortable in information technology (IT) and computer skills. They are also aware of the role of information technology (IT) and computers in medicine.

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