

Assessing computer literacy and attitude towards e-learning among final year medical students"

R Chudasama, N Godara, R Srivastava

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Abstract

Objective: to examines the level of computer literacy and patterns of computer usage of final year medical students
Settings & Design: study was done at the Government Medical College, Surat during September, 2007.
Method: The study population consisted of 235 medical students studying in final year during pre-test evaluation followed by one day training. One month after training post-test evaluation was done in 228 students out of 235. A questionnaire consisted of 32 items was used for data collection. It elicited demographic profile, access of computer, knowledge of computer and operating system, and internet related questions including self assessment of their computer knowledge. The data were entered into the computer and analysis was done using the Epi Info 3.5.1.
Results: All students who participated replied for various aspects of computer and internet use. Information regarding computer access, computer parts, hardware, software, various aspects of Microsoft Office, Operating System, how to prepare database for medical research, use and frequency of internet, their general knowledge for computer related terms, quality of questionnaires, and self assessment about their computer knowledge were assessed and analyzed.
Conclusion: study showed that medical students have access to substantial information technology resources and demonstrated knowledge towards computer and internet.

INTRODUCTION

With the development of computers and evolution of internet, Information Technology (IT) has had a positive impact on health care delivery system worldwide, particularly in the areas of disease control, diagnosis, patient management and teaching (1-3). Computer literacy has been a subject of educational research ever since the personal computers were introduced to the classroom, either as teaching aids or as tools for self study. Advances in telecommunication technology in the last two decades have led to the development of computer network that allow access to vast amount of information and services (4). The past few years have seen rapid advances in information and communication technology, and the pervasiveness of World Wide Web in everyday life has important implications for education. Research on computer literacy focused on the question whether medical students were ready for the foreseeable omnipresence of computers in the future doctors' professional environments (5), i.e. whether they possessed the necessary computer skills (6, 7).

It was assumed that computers would become ubiquitous tools for managing medical knowledge (8). In some medical

schools, privately owned computer was made a requirement for medical students (9). Female students are at a disadvantage due to different patterns of computer usage (10). These gender differences can be observed not only in students' computer related behaviors but also in their attitudes towards computer based and web based training. Researchers reported that among the first year students, 46% of men were in favor of replacing "traditional teaching with use of computers if possible" while only 22% women agreed with this statement.

Internet is now one of the most important sources of information for students in institutions of higher learning throughout the world. It has also become a popular medium for delivering educational materials (11). The internet has been used for medical education in diverse ways including teaching of organs, diagnosis of diseases and conduct of medical examinations and it is also being used as an important source of information for medical research (12). Medical and nursing students who have participated in computer education have stated that this mode of education has several advantages over traditional method of instruction (11). Despite these advantages, computer learning has

certain limitations like, some students have complained of insufficient time and limited computer access and others claimed that this mode of instruction lacks interactivity among students and between students and instructors that would be achieved in ideal classroom setting (13). This study examines the level of computer literacy and patterns of computer usage and attitude towards e-learning among final year medical students at Government Medical College, Surat.

METHODS

The Government Medical College, Surat was established in 1970 and as such it is the oldest institution for tertiary health care, teaching and research in South Gujarat region of India. The study population consisted of 235 medical students who were in the final year of Bachelor of Medicine and Bachelor of Surgery (MBBS) during 2007-2008 studying at Government Medical College, Surat. Total 235 students, out of 238 participated in this study, while 3 students were absent on day of pre-test evaluation. After assessing their knowledge regarding computer usage and internet use, one day training was given regarding various aspects of computer usage and other terms dealing with computer including use of internet and hours spending on internet. One month after giving training, their awareness regarding computer use and various aspects was again assessed by filling the post-test evaluation form. During post-test evaluation, 228 students were present out of 235 who have participated in pre-test evaluation and received training. The study was conducted during September & October, 2007.

A questionnaire that consisted of 32 items was used for data collection. It elicited demographic profile, access of computer, knowledge of computer and operating system, and internet related questions including self assessment of their computer knowledge. The questionnaire was pre-tested among group of 25 intern doctors and was revised to enhance its clarity and comprehension. Verbal informed consent was obtained from the students by disclosing that the data collected was for research purpose, that the questionnaire was anonymous, and that their participation in the study was voluntary. All the students who were present (235 students out of 238) during pre-test evaluation agreed to participate in the study with 100% response rate. The data

were entered into the computer and analysis was done using the Epi Info software version 3.5.1 developed by the Center for Disease Prevention and Control, Atlanta, Georgia, USA.

RESULTS

Present study was done in final year medical students involving 235 students during pre-test and 228 during post-test evaluation at Government Medical College, Surat.

Figure 1

Table I Questionnaire regarding computer access and computer parts

Information	Pre test (n=235)	Post test (n=228)	Z value	P Value*
Basic information about computer				
Have worked on computer in last one year	203 (86.4)	226 (99.1)	5.47	***
Have computer at home	153 (65.1)	169 (74.1)	2.11	*
Have heard about internet	235 (100)	228 (100)	0	
Have internet at home	116 (49.4)	132 (57.9)	1.85	NS
Identified computer parts correctly	195 (83.0)	215 (94.3)	3.91	***
Computer is				
A machine	190 (80.9)	216 (94.7)	4.69	***
An idiot	19 (8.1)	10 (4.4)	1.65	NS
Very intelligent	67 (28.5)	218 (95.6)	20.7	***
Do same work without mistake	160 (68.1)	203 (89.0)	1.54	NS
Calculate very fast	211 (89.8)	223 (97.8)	1.66	NS
Very useful in medical field & research	207 (88.1)	220 (96.5)	3.45	***
Hardware defined by				
Touching	167 (71.1)	215 (94.3)	6.37	***
Seeing	148 (63.0)	220 (96.5)	21.6	***
Its virtual	21 (8.9)	5 (2.2)	4.65	***
Sent through email	4 (1.7)	0	2.02	*
Can be loaded on computer	89 (37.9)	173 (75.9)	8.94	***
Software defined by				
Touching	0	0	0	
Seeing	38 (16.2)	10 (4.4)	4.29	***
Its virtual	87 (37.0)	186 (81.6)	10.9	***
Sent through email	177 (75.3)	214 (93.9)	5.77	***
Can be loaded on computer	184 (78.3)	216 (94.7)	5.34	***

P value: NS- Not Significant, () - <0.05, (**) - <0.01, (***) - <0.001

Table 1 shows questionnaire regarding computer access and knowledge about various computer parts. Almost all the participants (99%) have worked on computer in last one year and have identified computer parts correctly during post-test and were found statistically significant. Majority (95%) believed that computer is machine, very intelligent and very useful in medical field and research (96%). They have good knowledge regarding hardware (94%) and software (81%).

Figure 2

Table II Questionnaire items regarding use of various aspects of Microsoft Office

Information	Pre test (n=235)	Post test (n=228)	Z value	P Value*
Spread sheet means				
To write letter	0	0	0	
To enter data	144 (61.3)	207 (90.8)	7.97	***
To analyze data	57 (24.3)	203 (89.0)	18.5	***
Browsing the internet	16 (6.8)	2 (0.9)	3.37	***
Notepad means				
A small letter pad	56 (23.8)	106 (46.5)	5.26	***
Writes in text mode	186 (79.1)	199 (87.3)	2.38	*
Used to draw diagramme	29 (12.3)	12 (5.3)	4.64	***
A database	33 (14.0)	5 (2.2)	2.69	*
Calculation	13 (5.5)	3 (1.3)	2.53	*
Computer game	0	0	0	
Software	104 (44.3)	179 (78.5)	8.14	*
Hardware	5 (2.1)	1 (0.4)	1.66	NS
MS Word means				
A software	192 (81.7)	205 (89.9)	2.55	*
A hardware	4 (1.7)	2 (0.9)	0.76	NS
To write document	187 (79.6)	224 (98.2)	6.73	***
To do data analysis	54 (23.0)	12 (5.3)	5.69	***
As spreadsheet	29 (12.3)	6 (2.6)	4.07	***
To prepare charts & diagramme	80 (34.0)	158 (69.3)	8.13	***
MS Excel means				
A software	197 (83.8)	225 (98.7)	5.73	***
A hardware	4 (1.7)	3 (1.3)	0.35	NS
To write document	54 (23.0)	11 (4.8)	5.9	***
To do data analysis	144 (61.3)	221 (96.9)	10.5	***
As spreadsheet	83 (35.3)	225 (98.7)	19.8	***
To prepare charts & diagramme	131 (55.7)	220 (96.5)	37.3	***
MS PowerPoint means				
A software	177 (75.3)	219 (96.1)	6.73	***
A hardware	4 (1.7)	2 (0.9)	0.76	NS
To write document	31 (13.2)	15 (6.6)	2.4	*
To do data analysis	43 (18.3)	22 (9.6)	3.35	***
For presentation	162 (68.9)	223 (97.8)	9.11	***
As spreadsheet	25 (10.6)	0	5.3	***
To prepare charts & diagramme	113 (48.1)	189 (82.9)	8.48	***
MS FrontPage means				
A software	164 (69.8)	209 (91.7)	6.25	***
A hardware	0	0	0	
To write document	33 (14.0)	9 (3.9)	3.88	***
To do data analysis	16 (6.8)	3 (1.3)	3.05	***
To prepare web page	112 (47.7)	218 (95.6)	13.6	***
As spreadsheet	25 (10.6)	2 (0.9)	4.61	***
To prepare charts & diagramme	8 (3.4)	2 (0.9)	1.87	*
MS Outlook Express means				
A software	156 (66.4)	215 (94.3)	8.11	***
A hardware	0	0	0	
To write document	18 (7.7)	8 (3.5)	1.98	NS
To do data analysis	8 (3.4)	0	2.88	*
To write emails	101 (43.0)	217 (95.2)	14.8	***
To store correspondences	82 (34.9)	215 (94.3)	17.1	***
To prepare charts & diagramme	8 (3.4)	3 (1.3)	1.51	NS
Operating systems identified correctly				
Window XP	176 (74.9)	226 (99.1)	8.37	***
Window Vista	128 (54.5)	224 (98.2)	6.93	***
DOS	120 (51.1)	216 (94.7)	12.1	***
Unix	37 (15.7)	45 (19.7)	1.12	NS
Linux	82 (34.9)	95 (41.7)	1.51	NS

P value: NS- Not Significant, () - <0.05, (**) - <0.01, (***) - <0.001

Table 2 shows questionnaire regarding use of various aspects

of Microsoft (MS) office. Students' knowledge was assessed including use and meaning of spreadsheet, notepad, and MS office Word, MS office Excel, MS office PowerPoint, MS office FrontPage, MS office Outlook Express, type of operating systems used commonly in the computers.

Figure 3

Table III Questionnaire regarding computer use in medical field and research activities

Information	Pre test (n=235)	Post test (n=228)	Z value	P Value*
Database can be prepared in				
MS Excel	117 (49.8)	224 (98.2)	14.3	***
MS Power Point	52 (22.1)	12 (5.3)	5.45	***
MS Word	130 (55.3)	10 (4.4)	14.5	***
MS Access	48 (20.4)	221 (96.9)	27.4	***
Medical Research database prepared in				
MS Excel	138 (58.7)	215 (94.3)	10.02	***
MS Power Point	81 (34.5)	13 (5.7)	8.35	***
MS Word	74 (31.5)	6 (2.6)	25.5	***
MS Access	62 (26.4)	220 (96.5)	22.46	***
Epi info DOS based	8 (3.4)	222 (97.4)	59.4	***
Epi info Window based	13 (5.5)	221 (96.9)	12.1	***
SPSS	8(3.4)	221 (96.9)	34.6	***
STATA	22 (9.4)	215 (94.3)	27.2	***
SAS	4 (1.7)	193 (84.6)	32.7	***
Software do statistical analysis				
MS Power Point	26 (11.1)	3 (1.3)	4.49	***
MS Access	56 (23.8)	23 (10.1)	4.01	***
Epi info DOS based	8 (3.4)	222 (97.4)	59.4	***
Epi info Window based	18 (7.7)	221 (96.9)	42.8	***
SPSS	0	221 (96.9)	85	***
STATA	72 (30.6)	215 (94.3)	18.9	***
SAS	12 (5.1)	193 (84.6)	28.5	***
Epi Stat	96 (40.9)	219 (96.1)	16	***

P value: NS- Not Significant, () - <0.05, (**) - <0.01, (***) - <0.001

Various questions regarding computer use in medical field and research activities were also asked. As shown in table 3, knowledge regarding database preparation, medical research database preparation, name of softwares used for statistical analysis was assessed among these students.

Figure 4

Table IV Questionnaire regarding internet use and general knowledge

Information	Pre test (n=235)	Post test (n=228)	Z Value	P Value*
Use internet				
Yes, comfortably	174 (74.0)	221 (96.9)	7.43	***
Yes, but not confident	21 (8.9)	3 (1.3)	4.72	***
Heard it can be done	28 (11.9)	3 (1.3)	4.73	***
My friend helps me	21 (8.9)	7 (3.1)	2.66	*
Can't search the topics	8 (3.4)	3 (1.3)	1.05	NS
Want to learn searching	33 (14.0)	3 (1.3)	5.38	***
Don't know about this	0	0	0	
Frequency of internet use				
Daily	52 (22.1)	75 (32.9)	2.62	*
> once in a week	75 (31.9)	137 (60.1)	6.42	***
> once in a month	55 (23.4)	208 (91.2)	20.4	***
Rarely	7 (3.0)	2 (0.9)	2.63	*
Never	46 (19.6)	3 (1.3)	15.9	***
Described correctly following				
MP3	164 (69.8)	204 (89.5)	5.45	***
iPod	175 (74.5)	208 (91.2)	4.91	***
Pen drive	156 (66.4)	220 (96.5)	9.12	***
CD ROM	185 (78.7)	214 (93.9)	4.9	***
MSN Messenger	139 (59.1)	207 (90.8)	2.27	*
Yahoo Messenger	196 (83.4)	201 (88.2)	1.48	NS
URL	75 (31.9)	185 (81.1)	12.3	***
Described following internet terms correctly				
Broadband	142 (60.4)	195 (85.5)	6.37	***
Wi-Fi system	84 (35.7)	201 (88.2)	13.8	***
Modem	11348.1)	184 (80.7)	7.81	***
Login	148 (63.0)	216 (94.7)	10.3	***
Password	190 (80.9)	216 (94.7)	4.66	***
F1 key in keyboard stands for				
Motherboard	145 (61.7)	17 (7.5)	15.0	***
Help key	86 (36.6)	198 (86.8)	13.0	***

P value: NS- Not Significant, () - <0.05, (**) - <0.01, (***) - <0.001

Table 4 shows questionnaire regarding use of internet and knowledge regarding various items related with information and communication and internet use. Table 5 shows perception of participants as per their age in completed years, including quality of questionnaires and self assessment about their computer knowledge.

Figure 5

Table V Perception of participants about their computer knowledge

Information	Pre test (n=235)	Post test (n=228)	Z value	P Value*
Age of participants				
20 years	124 (52.8)	122 (53.5)	0.16	NS
21 years	98 (41.7)	96 (42.1)	1.17	NS
22 years	8 (3.4)	7 (3.1)	0.18	NS
23 years	5 (2.1)	3 (1.3)	0.67	NS
Quality of questionnaires				
Very puzzling	55 (23.4)	19 (8.3)	4.57	***
Interesting	146 (62.1)	203 (89.0)	7.11	***
Tiring	20 (8.5)	5 (2.2)	3.11	***
Boring	8 (3.4)	2 (0.9)	1.87	NS
Waste of time	8 (3.4)	3 (1.3)	1.51	NS
Could not understand its utility	37 (15.7)	1 (0.4)	6.3	***
Self assessment for computer knowledge				
Worst	25 (10.6)	14 (6.1)	1.76	NS
Average	54 (23.0)	73 (32.0)	2.17	*
Excellent	156 (66.4)	141 (61.9)	1.01	NS

P value: NS- Not Significant, () - <0.05, (**) - <0.01, (***) - <0.001

DISCUSSION

The response rate was 100% in present study which shows high interest of medical students in computer field. It was quite comparable to studies reported by various authors in different areas (14, 15). Analyzing information and technology skills is especially difficult when comparing results over many years: what would have been seen as a trivial computer task today might have required advanced knowledge a few years ago. The overall impression of present study was that medical students have comparable computer literacy skills and availability of computers and internet at their homes was similar to that of various other studies done in different countries (15-17). Present study has shown statistically significant association for having computers at home ($p<0.05$) and also internet use ($p<0.001$). A Tanzanian study indicated that 76% of the investigated doctors had no computer at home and only 50% felt that they understood the basic terminology and concepts of computing (18). Participants replied that computer is a machine ($p<0.001$), very intelligent ($p<0.001$) and very useful in medical field and research ($p<0.001$) during post-test evaluation. Also significant number of students replied both hardware and software correctly when they were asked to define these after receiving training. This shows awareness of medical students about the computers.

A vast diversity in response was observed during pre-test when students' knowledge was assessed about use of various aspects of Microsoft office, like use of spread sheet, note pad, MS word, MS excel, MS PowerPoint, MS FrontPage,

MS Outlook Express, and type of operating system used in computers. During post-test evaluation they replied correctly ($p<0.05$) for various uses of Microsoft Office. They were not much aware about the function of the spread sheet and MS FrontPage, but were found to be more aware about notepad, word, excel, power point, and outlook express use. Rajab LD et al (15) reported in their study that Jordanian dental students now enter the university with basic computer knowledge because their primary and secondary schools provide teaching in basic computer skills that includes introduction to computers, Windows, Microsoft office, and the internet. Link TM et al (19) have reported similar type of observations in their study among first year medical students in Austria.

Preparation of database can be done in MS excel was replied by almost 50% students during pre-test which was increased to 98% during post-test ($p<0.001$). When question asked that where medical research database prepared, 59% students replied in MS Powerpoint during pre-test which was improved upto 94% ($p<0.001$). Epi Stat, STATA & Epi Info window based software were used for statistical analysis mainly, replied by students during post-test ($p<0.001$). Use of MEDLINE database for medical research was reported by Romanov K et al (20). Many doctors lack the knowledge of the basic technological aspects of the Internet. Medical students may confuse a database such as Pub med or Med Escape with search engine such as Yahoo (21).

When asked for use of internet, 74% students replied using internet comfortably, 9% of the students though were using internet they were not confident to use it, while 14% students wanted to learn searching on internet during pre-test. After receiving training, 97% students replied they now uses internet comfortably ($p<0.001$), and only 1.3% students were still not confident and wanted to learn searching on internet, which shows significant reduction ($p<0.001$) in number for it. Lal P et al (22) in their study reported only 57% of the medical students in North India using internet for medical research activities. The response rate for use of internet by medical students in this study was comparable to similar type of international studies done in past few years, where percentage of students using the internet (irrespective of frequency of use) showed an average proportion of 80% (23, 24). One fifth of students responded using internet daily at time of pre-test evaluation, which was increased to 33% during post-test evaluation ($p<0.05$), 31.9% students were using internet more than once in a week during pre-test which was improved upto 60% during post-test evaluation.

Significant increase ($p < 0.001$) was found in frequency of internet use more than once in a month. Number of students not using internet or using rarely was also decreased ($p < 0.05$). Rajab LD et al (15) reported that most of the students used internet more frequently for pleasure than for medical education while more clinical students used internet more frequently for medical education than preclinical students. Students also have sufficient knowledge about MP3, iPod, pen drive, cd rom, msn messenger, yahoo messenger, URL, broadband, wi-fi system, modem, login and password.

Majority of the participants (94%) were 20-21 years of age. Quality of questionnaire was found interesting by 62% students during pre-test, increased to 89% at time of post-test evaluation ($p < 0.001$). In present study, 66% participants ranked excellent on their self assessment for computer knowledge during pre-test which was changed to 62% during post-test which may indicates that students have made their actual assessment after training during post-test evaluation, similarly 11% ranked worst in their computer knowledge during pre-test which was reduced to 6% during post-test which indicates improvement in their knowledge regarding computers. Studies have reported lower self assessment for participants on their computer knowledge (15, 17).

CONCLUSION

Students certainly need some kind of formal introduction and education to the new information technology for learning purposes. The results of this study indicate that medical students had access to substantial information technology resources and demonstrated knowledge towards computer and internet. This comes as no surprise in the age of globalization where knowledge knows no boundaries. Provision of structured computer and information technology training for medical students would equip them with the skills they need to practice up to date and evidence based medicine in future, which are essential to improving the quality of medical care. Further research should be done with focus on designing and evaluating computer and information technology training for students and medical faculties also.

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Author Information

Rajesh K. Chudasama, M.D. – Community Medicine

Assistant Professor, Community Medicine Department, Government Medical College, Surat – 305001, Gujarat, India.

Naresh K. Godara, M.D. – Community Medicine

Assistant Professor, Community Medicine Department, Government Medical College, Surat – 305001, Gujarat, India.

Ratan K. Srivastava, M.D. – Community Medicine

Associate Professor & Head, Community Medicine Department, Government Medical College, Surat – 305001, Gujarat, India.