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## Pattern of computer and internet use among medical students in Coastal South India

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### Abstract

**Background:** The use of computers is increasing among medical students, therefore we carried out a cross sectional study in Mangalore, India, with the objective of assessing the pattern of computer and Internet use among both undergraduate and postgraduate medical students.

**Methods:** A total of 500 medical students from 4 different medical colleges in Mangalore participated in the study. 400 were undergraduates and 100 were postgraduates / interns. A pre-tested semi-structured questionnaire was used to collect data and data analysis was done using SPSS Version 11.

**Results:** The majority of students who participated in the study were from the age group 19-21years constituting 34.6%. The computer was used for entertainment mainly by the 1<sup>st</sup> and 2<sup>nd</sup> year medical students (69.5%) whereas 40% PG / Interns use it for general information and 31% for research activities. Majority of the PG/Interns (77%) were satisfied with computer assisted teaching while 20% 1<sup>st</sup> and 2<sup>nd</sup> year students were not. Majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (50.5%) use Internet most often to communicate socially while 21% Pre final and final year students use Internet most often to engage in work for classes. The use of E-mail was the most popular of Internet services used by 87% PG/Interns.

**Conclusion:** A significant relationship was demonstrated between the year of study and the purpose of computer/Internet use. As the students progress through their curriculum the use of computer for entertainment is declining and use for general information and thesis / research work is rising.

**Keywords:** medical education, social communication, gathering information

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### Introduction

College students are a unique population. Occupying a middle ground between childhood and adulthood, between work and leisure, college students have been at the forefront of social change since the end of World War II. Use of the internet is a part of college students' daily routine, in part because they have grown up with computers. It is integrated into their daily communication habits and has become a technology as ordinary as the telephone or television. College students use the internet nearly as much for social communication as they do for their education. But just as they use the internet to supplement the formal parts of their education, they go online to enhance their social lives (Jones, 2002).

Over the last several decades studies have shown that the use of computerized information systems by medical professionals can improve the quality of care, enhance the use of evidence-based treatment, and maintain and update knowledge. It has also been shown that even though doctors generate various questions during patient care, many of these questions remain unanswered because physicians typically search answers to only one third of the questions.

One of the major goals of medical education is to encourage students to maintain their knowledge of medical science by becoming life-long learners. Adequate skills in information seeking and regular use of original scientific sources are key elements in this process. Additionally, it is believed that medical students need training to learn how to use Web-based search tools and techniques in order to find high-quality information resources (Romanov & Aarnio, 2006). Advances in Information Technology (IT) have changed our society over the past few decades. In the medical field, computers have been used mostly for office procedures and billing, biomedical practice and research, and less often for Medical Education.

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Two important points pertinent to Medical Education have been emphasized. First, the biomedical knowledge base is expanding rapidly and cannot therefore be taught in its entirety. Second, self-directed learning needs to be taught to acquire life-long learning skills (Mony et al., 2004).

In India, postgraduates in medical institutions are the first-level practitioners of education, patient care and research. Changes in medicine and IT (Information Technology) continue to influence their learning. The aims of this survey are to estimate the current level of computer use and identify the training needs of undergraduates and postgraduates.

## Methods

### Setting

The present cross sectional study was carried out in 4 medical colleges in Mangalore, Dakshina Kannada (South Kanara) district, Karnataka, India.

### Subjects

The study population consisted of 500 medical students (400 undergraduates, 100 postgraduates / interns) from 4 different medical colleges in Mangalore, 100 students each from 1<sup>st</sup> MBBS, 2<sup>nd</sup> MBBS, pre-final MBBS, final MBBS & postgraduates / interns. Before the start of the study the investigator visited the medical colleges and got the prior permission from authorities concerned. Prior to administering the questionnaire, the class was addressed regarding the purpose and process of data collection. Then, 25 students were selected from each year of MBBS from each of the four medical colleges using simple random sampling. After written informed consent from the study subjects, the data was collected by personal interviewing.

Data was collected using a pre-tested semi-structured questionnaire. The survey instrument was developed from the literature and informal discussion with experts, and was pre-tested on a group of 25 students, 5 students from each batch of MBBS and then modified accordingly. In the final analysis these 25 students were excluded.

The study was approved by the Institutional Ethical Committee of Kasturba Medical College, Mangalore. The data was analysed by using SPSS (Statistical Package for Social Sciences) version 11. The Chi square test for association was used and  $P < 0.05$  was considered as statistically significant.

## Results

### Demographic profile of students

Demographic profile of students is described in Table 1, which shows that maximum number of students who participated in the study were of

the age group 19-21 years constituting 173 (34.6%). Among them 280 (56%) were males.

### Use of the computer

Student's ability and pattern of use of the computer is presented in Table 2. It was observed from the study that 158 (79%) 1<sup>st</sup> and 2<sup>nd</sup> year medical students and 68 (68%) postgraduates / interns had their own computer. The majority of postgraduates / interns (40%) use the computer for general information and 31 (31%) for thesis and research work while majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (69.5%) use it for entertainment and 7 (3.5%) use the computer for other purposes such as downloading music, videos etc. This was found to be statistically significant. The majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (62%) use computer at home or hostel most of the time, while 78 (39%) pre-final and final year medical students use it in cyber cafés and 19 (9.5%) students did not specify a location. It was observed that most of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (42.5%) prefer the internet for getting required information while 69 (34.5%) pre-final and final year medical students prefer textbooks and 54 (27%) were non-specific about the preferred medium, with choice of medium depending on the type of information searched for.

### Use of the internet

The student's use of internet services and resources is shown in Table 3. It was observed that majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (82%) first started using the internet at home before arriving at college while 36 (36%) postgraduates / interns started after arriving at college. Majority of postgraduates/ interns 54 (58.1%) preferred internet over text books because it accessed the latest knowledge and 37 (22.2%) 1<sup>st</sup> and 2<sup>nd</sup> year medical students preferred it because of easy accessibility, while 20 (12%) thought that they preferred the internet for multiple reasons. When used for study purpose, 171 (85.5%) pre-final and final year medical students use the internet for information of recent advances. Majority of the students 98 (98%) postgraduates / interns and 185 (92.5%) 1<sup>st</sup> and 2<sup>nd</sup> year medical students agreed with the fact that computer and internet use should be encouraged in teaching institutions. 77 (77%) postgraduates/ interns were satisfied with computer assisted teaching while 40 (20%) 1<sup>st</sup> and 2<sup>nd</sup> year students were not. It was observed that majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students 101 (50.5%) use the internet most to communicate socially and 54 (27%) use it for entertainment, while 42 (21%) pre-final and final year medical students use it to engage in work for classes and only 10 (5%) did not specify the use. E-mail was the favorite communication tool used by postgraduates / interns (87%); whereas, 45 (22.5%) 1<sup>st</sup> and 2<sup>nd</sup> year medical students used instant messaging. It was observed that majority (126) of pre final and final year medical students (63%), spend less than 3 hours with the computer and going online in a

week. It was also observed that majority (about 68) of postgraduates / interns (68%) spend only 1-2 hours using the internet for social communication (E-mail, chatting etc weekly).

**Relationship between year of study and commonly assessed sites**

Table 4 shows that only a few 1st year medical students (4%) commonly use PubMed and other

journal sites but in subsequent years the use of these sites increased (33%).

Postgraduates / interns are using PubMed and other journal sites. We can also see that very few postgraduates / interns (9%) were using other sites such as Orkut, Rediff, Indiatimes.com etc., in comparison to 1st year medical students 17 (17%) a difference found to be statistically significant.

**Table 1: Baseline characteristics of the study population (N=500)**

Characteristics	Number	Percentage (%)
1. Age Group (yrs)		
(a) <19	113	22.6
(b) 19-21	173	34.6
(c) 22-24	138	27.6
(d) >24	76	15.2
2. Gender		
(a) Male	280	56
(b) Female	220	44
(3) Year of Study		
(a) 1 <sup>st</sup> MBBS	100	20
(b) 2 <sup>nd</sup> MBBS	100	20
(c) Pre Final MBBS	100	20
(d) Final MBBS	100	20
(e) PG / Interns	100	20

**Table 2: Pattern of use of computers among medical students**

Pattern of Computer Use	1 <sup>st</sup> & 2 <sup>nd</sup> year Medical Students	Pre Final & Final year Medical Students	Post Graduate / Interns	Chi- Square	P - value
	N = 200	N = 200	N = 100		
1. Do you have your own computer?				71.564	P = 0.001
(a) Yes	158 (79.0%)	77 (38.5%)	68 (68.0%)		
(b) No	42 (21.0%)	123 (61.5%)	32 (32.0%)		
2. Purpose for which it is used mostly?				73.555	P = 0.001
(a) Entertainment	139 (69.5%)	109 (54.5%)	28 (28.0%)		
(b) General information	50 (25.0%)	53 (26.5%)	40 (40.0%)		
(c) Thesis and Research	4 (2.0%)	29 (14.5%)	31 (31.0%)		
(d) Others	7 (3.5%)	9 (4.5%)	1 (1.0%)		
3. Place where you use computers mostly?				47.727	P = 0.001
(a) Cyber cafe	26 (13.0%)	78 (39.0%)	17 (17.0%)		
(b) Home/Hostel	124 (62.0%)	75 (37.5%)	64 (64.0%)		
(c) College	26 (13.0%)	28 (14.0%)	8 (8.0%)		
(d) Others	24 (12.0%)	19 (9.5%)	11 (11.0%)		
4. Preferred medium for getting required information-				14.084	P = 0.08
(a) Text books	42 (21.0%)	69 (34.5%)	24 (24.0%)		
(b) Internet	85 (42.5%)	67 (33.5%)	42 (42.0%)		
(c) Newspaper	13 (6.5%)	6 (3.0%)	8 (8.0%)		
(d) Television	4 (2.0%)	4 (2.0%)	1 (1.0%)		
(e) Others	56 (28.0%)	54 (27.0%)	25 (25.0%)		

**Table 3: Use of Internet among study population**

Internet Use	1 <sup>st</sup> & 2 <sup>nd</sup> year Medical Students  N= 200	Pre Final & Final Year Medical Students  N = 200	Post Graduate/ Interns  N = 100	Chi- Square	P -value
1. Where did you first start using internet?				19.288	P = 0.001
(a.) College	36 (18.0%)	30 (15.0%)	36 (36.0%)		
(b) Home before arriving at college	164 (82.0%)	170 (85.0%)	64 (64.0%)		
2. Reason for preferring internet over text books:				5.168	P = 0.74
(a) Time saving	28 (16.8%)	21 (13.7%)	8 (8.6%)		
(b) Latest knowledge	80 (47.9%)	80 (52.3%)	54 (58.1%)		
(c) Easy accessibility	37 (22.2%)	29 (19.0%)	19 (20.4%)		
(d) Nonspecific	2 (1.2%)	3 (2.0%)	2 (2.2%)		
(e) Others	20 (12.0%)	20 (13.1%)	10 (10.8%)		
3. Internet mostly used for (study purpose)				10.076	P = 0.12
(a) To know about drugs	9 (4.8%)	2 (1.0%)	2 (2.0%)		
(b) Rational prescribing	4 (2.1%)	6 (3.0%)	-----		
(c) Therapeutic guidelines	15 (8.0%)	21 (10.5%)	13 (13.0%)		
(d) Recent Advances	160 (85.1%)	171 (85.5%)	85 (85.0%)		
4. Should computer and internet use be encouraged in teaching institutions?				7.169	P = 0.12
(a) Yes	185 (92.5%)	181 (90.5%)	98 (98.0%)		
(b) No	7 (3.5%)	12 (6.0%)	2 (2.0%)		
(c) Don't know	8 (4.0%)	7 (3.5%)	-----		
5. Are you satisfied with computer assisted teaching?				1.946	P = 0.74
(a) Yes	149 (74.5%)	143 (71.5%)	77 (77.0%)		
(b) No	40 (20.0%)	45 (22.5%)	16 (16.0%)		
(c) Don't know	11 (5.5%)	12 (6.0%)	7 (7.0%)		
6. Use internet most often to:				41.893	P = 0.001
(a) Communicate socially	101 (50.5%)	103 (51.5%)	41 (41.0%)		
(b) Engage in work/or classes	19 (9.5%)	42 (21.0%)	19 (19.0%)		
(c) Be entertained	54 (27.0%)	35 (17.5%)	19 (19.0%)		
(d) Communicate professionally	6 (3.0%)	6 (3.0%)	16 (16.0%)		
(e) Don't know	6 (3.0%)	4 (2.0%)	1 (1.0%)		
(f) Others	14 (7.0%)	10 (5.0%)	4 (4.0%)		

**Table 3: Use of internet among study population**

Internet Use	1 <sup>st</sup> & 2 <sup>nd</sup> year Medical Students	Pre-final & Final Year Medical Students	Post Graduate/ Interns	Chi- Square	P - value
	N= 200	N = 200	N = 100		
7. Internet communication tools used most by you:				32.224	P = 0.001
(a) E-mail	122 (61.0%)	153 (76.5%)	87 (87.0%)		
(b) Instant messaging	45 (22.5%)	22 (11.0%)	6 (6.0%)		
(c) Web boards	11 (5.5%)	11 (5.5%)	6 (6.0%)		
(d) Chat rooms	18 (9.0%)	11 (5.5%)	-----		
(e) News groups	4 (2.0%)	3 (1.5%)	1 (1.0%)		
8. How much time do you spend with computer and going online in a week?				18.314	P = 0.001
(a) <3 hrs	97 (48.5%)	126 (63.0%)	48 (48.0%)		
(b) 4-7 hrs	66 (33.0%)	62 (31.0%)	35 (35.0%)		
(c) >7 hrs	37 (18.5%)	12 (6.0%)	17 (17.0%)		
9. How much time do you spend in using internet for social communication (e-mail/ chatting) in a week?				12.097	P = 0.01
(a) 1-2 hrs	108 (54.0%)	131 (65.5%)	68 (68.0%)		
(b) 2-3 hrs	48 (24.0%)	47 (23.5%)	18 (18.0%)		
(c) > 3 hrs	44 (22.0%)	22 (11.0%)	14 (14.0%)		

**Table 4: Year or study vs. commonly assessed sites**

Year of study	Sites							
	Google		Yahoo		Pubmed and other journal sites		Others (Orkut, Rediff, Indiatimes.com etc)	
	No.	%	No.	%	No.	%	No.	%
1 <sup>st</sup> year medical students	66	66	13	13	4	4	17	17
2 <sup>nd</sup> year medical students	57	57	16	16	14	14	13	13
Pre-final year medical students	59	59	7	7	24	24	10	10
Final year medical students	69	69	6	6	10	10	15	15
Postgraduates/interns	50	50	8	8	33	33	9	9

Chi-square = 45.962, df = 12, p value = 0.0001

## Discussion

### **Computer ownership**

All the participants were found to use computers for varying purposes. Among them 79% 1<sup>st</sup> and 2<sup>nd</sup> year medical students had their own computer, which is less than among college students of America (85%)(Jones, 2002) but more than the 48.9% of first year medical and dental students of Ludhiana, India. (Arora, 2003). The reason for higher proportion of students possessing computers in our study might be due to affordability as our study was carried out in private medical colleges.

### **Purpose of computer use**

In the study, we found that 69.5% of 1<sup>st</sup> and 2<sup>nd</sup> year medical students use computers for entertainment; whereas the majority of postgraduates/interns used it for general information, thesis and research work. A study conducted in Jammu, India (Sharma et al. 2006) revealed that 52% undergraduates used computers for entertainment and 80% postgraduates used it for thesis and research work. The association between year of study and purpose of computer use was found to be statistically significant. The use of computers for entertainment is decreasing and use for general information and thesis and research is increasing from the first year to subsequent years. The reason for this is perhaps because medical students in their final year do small research projects and in the postgraduate studies, thesis/research component is mandatory.

### **Place and computer use**

In this study, we found that a majority (62%) of 1<sup>st</sup> and 2<sup>nd</sup> year medical students use computers at home or hostel, while only 13% use it in cyber cafes; whereas, in a study conducted at Ludhiana, India (Arora, 2003) 48.9% students were found to use computers at home or hostels and similar percentage 48.9% used it in cyber cafes. This difference may be because of affordability of the students as this study was carried out in private medical colleges.

### **Preferred medium for getting required information**

The preferred medium for getting information among both undergraduates and postgraduates in the present study was the internet (42%) followed by textbooks (24%). This indicates that the use of the internet is increasing for getting required information. These findings are quite different from the study conducted in Jammu, India (Sharma *et al.* 2006), which revealed that 75% undergraduates preferred textbooks for getting required information. The difference between the findings of these studies may be due to the increasing access to computers among undergraduates as many institutions are providing computers to undergraduates. The reason for this is better infrastructure in private medical schools in comparison with that of

government run medical schools, as in private medical schools the students have to pay for the facilities.

### **Internet access**

It was seen that the majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students (82%) first started using the Internet at home before arriving at college. In a study conducted in America (Jones, 2002) found that about 49% students first began using the Internet in college, while 47% students first started using it at home before arriving at college. This difference may be due to increasing access to the internet in India during the last few years.

### **Internet use**

We found that the majority of students use the internet for information of recent advances in medicine. A majority of 1<sup>st</sup> and 2<sup>nd</sup> year medical students were found to use the internet for social communication (50.5%) and entertainment (27%). These figures are slightly higher than the findings of the study conducted in America (Jones, 2002) where 42% college students were found to use the Internet primarily to communicate socially and about 10% for entertainment. In the study only 9.5% 1<sup>st</sup> and 2<sup>nd</sup> year medical students were found to use the internet to engage in work for classes. During subsequent years of study the use of the internet for this purpose is increasing with 21% among pre final and final year medical students and 19% among postgraduates/interns. This may be because as students progress to subsequent years the work load increases and they can not find time for entertainment.

### **Commonly accessed sites**

In our study, we found that PubMed and other journal sites are accessed by only 4% first year medical students. During subsequent years of study, the use for this purpose is increasing and about 33% postgraduates/ interns commonly accessed PubMed and other journal sites. This is because the first year students are unaware about research publications and mostly get the required information from textbooks and research is the lowest priority among 1<sup>st</sup> year medical students. Use of the internet is for entertainment purpose mainly by accessing sites like Google, Yahoo, Orkut, etc.

### **Computer assisted teaching**

In this study, it was found that a large majority (92.5%) of 1<sup>st</sup> and 2<sup>nd</sup> year medical students and 98% postgraduates/ interns advocated that computer and the internet use should be encouraged in teaching institutions which is comparable with the study done in Jammu, India (Sharma *et al.*,2006). Computer assisted teaching is gaining importance in the medical field as students can be shown various procedures, demonstrations, surgeries and also for E- learning purposes.

### **Internet and social life**

In the study, we found that only 6% pre-final and final year medical students spend more than seven hours with computers and going online in a week and a majority of postgraduates/ interns (68%) spend only 1-2 hours using the internet for social communication (E-mail/Chatting) in a week which suggests that students become busier in their studies/clinical work as they progress to subsequent years.

### **Internet communication tools**

It was found e-mail was the most commonly used internet communication tool. A study conducted in America (Jones, 2002) found that 62% students used E-mail and about 29% use instant messaging as an internet communication tool. In a Nigerian study (Ajuwan, 2003) 73.4% of medical students surveyed reported using e-mail. In this study it is shown that the use of e-mail is increasing as students progress to subsequent years. (61% among 1<sup>st</sup> and 2<sup>nd</sup> year medical students increasing to 87% among postgraduates/interns). However, the use of instant messaging was shown to decrease in subsequent years of study, (22.5% among 1<sup>st</sup> and 2<sup>nd</sup> year medical students and only 6% among postgraduates/interns). This may be because students become busier and more serious about their studies and don't prioritize much time for instant messaging.

### **Conclusions**

The use of the computer and internet is rapidly becoming a key component of medical education in many parts of the world. In this study on medical students in Mangalore, India a significant relationship was seen between the year of study and the purpose of computer and internet use. As students progress to

subsequent years, the use of computer for entertainment decreased and use for general information and thesis/ research work increased. Computer assisted teaching should be encouraged in all medical colleges.

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