ABSTRACT

Background: Due to the diverse background of medical students in India and the different levels of knowledge and usage of computer, a prior assessment is necessary for improving use of computers in training tomorrow’s health professionals.

Objectives: To assess computer literacy and computer use among medical students of a private medical institution.

Methodology: In a cross-sectional study conducted in 2012, students of MBBS course participated. A prestructured questionnaire in paper format collecting detail information about background, resources and a computer use scoring system based on frequency of use of computer applications was administered. Measures of central tendency and dispersion were used along with analysis of variance (ANOVA) to analyze the data with the help of Epi Info and statistical package for social sciences (SPSS).

Results: A total of 524 students were surveyed of which 375 (71.5%) were local, from Mumbai, while 149 (28.5%) were from different states of India. Total 425 (81%) students gave history of having computer as a subject during schooling. Out of 149 nonlocal students, 42 (28.2%) were not exposed to computer during schooling. All 524 students had some or other time used either desktop or laptop; however, 39 (7.5%) of were not confident of using basic computer applications. One hundred and eighty-seven (35.7%) students regularly visited cyber café while 135 (25.8%) students were found visiting e-library of the college. There was significant difference in computer usage score in the students who had computer as a subject during schooling (p < 0.001). There was no significant gender or age difference in computer usage. Also, there was no significant difference in usage among students from Mumbai and rest of the country.

Conclusion: In view of improving the skills of future health professionals, the use of computers should be an integral part of medical curriculum in India. The database handling, an important skill for tomorrow’s health professionals, needs special attention. The medical colleges in India should have e-libraries with easy access to students.

Keywords: Medical education, Computer literacy, Policy reform.


Source of support: Nil

Conflict of interest: None

INTRODUCTION

As the world advancing, computers are becoming an essential part of personal life. The increasing use of electronic gadgets in professional life is now inevitable. The medical teaching community in India is already little late in joining the computer revolution. The studies in the past have shown beneficial effects that computer-aided learning (CAL) can have on the learning outcome; however, it has not attracted significant attention in developing countries including India. There has been a rapid expansion of computer use in medicine in the last two decades in US for a number of uses, including medical education at all levels, point of service medical information (especially diagnostic, treatment and medications), medical research electronic medical records (EMR), electronic billing, electronic prescribing, and the collection of data to determine quality of care and quality of medical education. Some possible reasons are availability of high speed and wireless connections, decreasing cost of hardware and software, public and government demands for increased quality of care and documentation and improving medical education.

Given the enormous complexity and inertia of healthcare system in India, meaningful sustainable improvement in healthcare delivery system is needed. To achieve this, such improvement efforts should be linked to concurrent and equally serious efforts to foster better professional development. In both the clinical as well as nonclinical work of a doctor, the computer skills are becoming more and more essential now even in...
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India. The internet is a great resource of information and medical students cannot be kept away from it. Some of the private medical institutes have good e-library facilities. However, a study from south India has concluded that although medical students use computers frequently it is predominantly for simple tasks, which may not contribute to the knowledge and data gathering skills. Actually, the computer usage capabilities of medical students for introduction of CAL have not been adequately assessed in India.

The students getting enrolled for the MBBS course in Mahatma Gandhi Mission’s Institute of Health Sciences, a private Deemed University (where the study has been conducted), have geographic diversity. Though many students are from neighboring districts of Mumbai, Navi Mumbai and Thane, a significant number of students belong to rest of Maharashtra state and other states of India. The non-resident Indian (NRI) students (mostly underwent schooling in US and Europe) also comprise the student population though in small number. Due to diverse background and different levels of knowledge and usage of computers among the students getting enrolled in Indian medical institutes spread all over country, a prior assessment is necessary for improving use of computers in teaching.

The study has mainly aimed to assess computer literacy and computer use among medical students of a private medical institution with the objectives of generating background data about computer resources and knowledge about computer use among medical students and interns from diverse geo-cultural background and to study the computer usage pattern among the subjects.

METHODOLOGY

The present study was a descriptive cross-sectional study to assess computer literacy and use among medical students in Medical College of Mahatma Gandhi Mission’s Deemed University at Kamothe, Navi Mumbai, carried out in year 2012, after obtaining the approval of Institutional Ethics Committee.

Inclusion/Exclusion of Study Subjects

The study subjects included the students of MBBS course from all (1st to 3rd professional) years and Interns. All students were included in the study. The students who have completed their schooling abroad were excluded from the study, as they do not become part of the homogeneous group. The informed consent was obtained from the study subjects after explaining the aims and objectives of the study. The participation in the study was on voluntary basis. As wide variation in the age group was expected to influence the study results considering the rapid changes in the education sector due to developments in information technology in the country, any outliers in the age variable were planned to be excluded from dataset at the time of data analysis.

Data Collection

A prestructured questionnaire in paper format collecting detail information about background, resources, frequency of use of computer applications, opinion about use of computers in medical teaching was administered. Questionnaire included a nonweighted scoring system recording score of 15 activities on five-point scale maximally permitting 75 points as a computer usage score (CUS). The questionnaire was reviewed by two faculty members independently and validated after testing on the 20 medical students to check for clarity and comprehension.

Data Analysis

The collected data were computerized in Microsoft Excel and was analyzed using statistical package for social sciences (SPSS) and Epi Info. While analyzing grouping of students was done on different basis, such as professional year, local and nonlocal students, those who had received computer training in the school and those who had not. The students who have done their schooling from Navi Mumbai, Mumbai and neighboring Thane districts were considered as local. Professional year wise there were five groups as 1st professional, 2nd professional, 3rd professional part I, 3rd Professional part II and Interns. Measures of central tendency and dispersion were used along with analysis of variance (ANOVA) to analyze the data with the help of Epi Info and SPSS.

RESULTS

Background Data

At the time of study conducted, 598 students including Interns were studying in the college. As per the study protocol, as seen in Table 1, the study sample size was 524 as the 74 (12.37%) students were not included in the study based on exclusion criteria. Out of 74 the 59 (9.87%) students had not volunteered to participate in study, 12 (2.01%) had schooling outside India, 2 proforma were incompletely filled and 1 participant excluded as an outlier for age. Majority of the students (375, 71.37%) were from neighboring metro city of Mumbai, Navi Mumbai and Thane area. As seen in Figure 1, remaining 149 students were from all over the country.
The students were from different sociocultural background and 472 (90%) were from schools having English as a medium of instructions, while 52 (10%) had studied in vernacular medium. Among the 149 nonlocal students, these proportions were 79.2 and 20.8% respectively.

Total 425 (81%) students had computer as a subject during schooling. Out of these, 247 (58%) learned it from primary school while to 178 (42%) it was introduced from secondary school. Out of 149 outstation students, 42 (28.2%) students did not have computer as a subject during schooling while 107 (71.8%) students of which 56 (52.3%) studied it from primary school while 51 (47.7%) in secondary school. When asked about learning satisfactorily common applications during the schooling period the response in descending order was for Browser (326, 62.2%), Word Processor (325, 62%) PowerPoint Presentation (324, 61.8%), Spread Sheet (303, 57.8%), e-mail (299, 57.1%) and for database management (173, 33%).

Out of 99 (19%) students who were not taught computer as a subject during schooling, 15 students had done a short computer course during vacations. Total 162 (31%) students had done such a course before joining MBBS course. The 84 (16%) students, who had no privilege of computer being taught in the school, had also not done any computer course voluntarily. Of these 48 were from Mumbai (48/375:12%), and 36 were from outstation (36/149:24%).

It was also noted that 124 (23.7%) mentioned that they learned computer on their own due to self-motivation. Either family members or friends helped in majority of these, but 19 students had mentioned that they learned it without any help. All 524 study subjects had used desktop or laptop some or other time. However, 39 (7.5%) students,
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which is not a small proportion, mentioned that they were not confident of using basic computer applications and definitely is a matter of concern.

Computer Resource Assessment

Total 509 (97.1%) students had either a desktop or laptop at home, 377 (71.9%) had both and 15 (2.8%) had neither, while 357 (70.1%) had it especially for their own use. Out of 509, 335 (65.8%) students had printer at home while 475 (93.3%) had internet access at home, most of which were broadband connections. The 439 (86%) had more than 1 GB RAM in their computer while 468 (92%) had CD/DVD writer and 494 (97%) use pen drive for data storage and exchange.

Majority of the students were using Internet Explorer, Firefox or Chrome as a browser. Only 12 (2.3%) students had no e-mail account, but also to be noted that only 96 (18.3%) use e-mail client software. When urgently needed while in campus, 241 (46%) student said that they use the friend’s computer while 187 (35.7%) visit Cybercafé, 110 (21%) once, 60 (11.5%) two to four times and 17 (3.2%) more than four times in a month. The use of e-library is comparatively less. Only 135 (25.8%) students mentioned that they visit e-library, 68 (13%) once, 50 (9.5%) two to four times and 17 (3.2%) more than four times a month.

Computer Usage Pattern

As seen in Figure 2, the most common computer use was for the Google search in browser with highest score of 4.33. It also should be noted here that use of spread sheet for database management had very low score of 0.9. The total mean computer usage score (CUS) was 37.91 (SD 12.09, SE 0.53). As the Table 2 showing ANOVA results, we found that there was significant difference (p < 0.001) between the computer usage scores of those who had the privilege of learning it in school (n = 425, mean CUS: 38.76) and those who did not had (n = 99, mean CUS: 34.23).

The mean CUSs were different among the students of different professional years; 38.14 in 1st professional, 38.13 in 2nd professional, 34.56 in part I 3rd professional and 39.96 in part II 3rd professional students and 38.32 among Interns. As Figure 3 shows, this difference was

![Fig. 2: Mean computer usage score for different activities](image-url)

Table 2: Computer usage score by computer in schooling

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>95% CI</th>
<th>Statistics</th>
<th>p-value</th>
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<tr>
<td>Computer learned in school</td>
<td>425</td>
<td>38.76</td>
<td>11.38</td>
<td>0.552</td>
<td>37.68 - 39.85</td>
<td></td>
<td></td>
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<tr>
<td>Computer not learned in school</td>
<td>99</td>
<td>34.23</td>
<td>14.26</td>
<td>1.43</td>
<td>31.39 - 37.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>524</td>
<td>37.91</td>
<td>12.09</td>
<td>0.528</td>
<td>36.87 - 38.94</td>
<td></td>
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<tr>
<td>Model fixed effects</td>
<td></td>
<td>2.60</td>
<td>4.84</td>
<td>70.97</td>
<td>9.37</td>
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<td>ANOVA results</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1647.76</td>
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<td>Mean square between groups</td>
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<td>143.30</td>
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<tr>
<td>Mean square within groups</td>
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<td></td>
<td></td>
<td></td>
<td>11.50</td>
<td>0.001</td>
</tr>
<tr>
<td>Welch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.71</td>
<td>0.004</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.71</td>
<td>0.004</td>
</tr>
</tbody>
</table>
found statistically significant (p < 0.05) on applying ANOVA. However, on further analysis, we found that this was mainly due to dip in the mean score of part I 3rd professional students having almost 25% of students from outstation and with low CUS pooling down the batch average. Also, when studied for difference in CUS of all outstation students it was found not significant (p > 0.05). It was also observed that, age and genderwise, there was no significant difference in CUS (p > 0.05).

DISCUSSION
Advances in information technology (IT) have changed our society over the past two decades rapidly. In the medical field, computers have been used mostly for office procedures and billing, biomedical practice and research and less often for medical education. This is not only in India but also other neighboring Asian countries like Pakistan and Sri Lanka have more or less similar situation.
India has such diversity in sociocultural background that it is called as countries within a country. Our study had students from the metro city of Mumbai who had better opportunities of receiving computer education in school. A study conducted earlier in Mumbai² had observed significant disparity in local and outstation students. However, we found in our study that over the years, there has been growth in IT sector all over the country and students from remaining parts of the country are not much behind in having exposure to computer education. It was also observed that many students find that knowledge gained about the computer during the school years is not sufficient and have taken a short-term course before joining the MBBS course. The study conducted by Arora R⁸ at Ludhiana (Punjab) had found that 30% students had done a computer course before joining medical college and less than 50% could use Word Processor or PowerPoint. In the study done in the medical college of Gwalior⁴ (Madhya Pradesh) in 2007, it was found that 72.3% students learned computer by self-learning.

While studying the computer resources in terms of owning a desktop or laptop and having internet connection, we found that student does consider it an important asset. The 97% students were having one at home while 70% had it exclusively for their own use. This percentage was 62.8 in the study in Mumbai.² In that study, 52.6% had internet connection at home while present study this proportion was more than 90%. It also attributes to rapid increase in use of dongles from mobile operators for wireless internet connectivity in recent years. Compared to other earlier studies mostly conducted in public sector, we have found that availability of resources was not much issue. It also should be noted here that due to liberal privatization in medical education sector in last few decades, the private medical colleges outnumber the government medical colleges and the majority of students in private universities are from relatively higher socio-economic strata.

To study the computer usage pattern different researchers have used different question sets, some of which are common in all. However due to this variation, the actual scores are not comparable, though the inferences drawn are more or less indicating similarity. The study conducted by Seetharaman N¹⁰ in a private medical college in Chennai (South India), found that lack of formal training in computer usage is reflected in the fact that a sizable proportion of students were not confident in key IT skills, such as performing an online literature search (74.3%) or perform statistical analysis (79.4%). Other studies not only from India⁴,⁵,⁸,¹¹,¹², but also from other developing countries⁶,⁷,¹³-¹⁵ have similar findings. Our study reiterates the fact that though there is improvement in computer usage it needs to be well directed toward appropriate skill development.

The study conducted by Panchbhai TS et al² had found the difference in computer usage in different professional years. Though our analysis initially showed similar findings, on deeper search we found that it is attributed to average low score of a particular batch with large number of outstation students having insufficient training in school years. At the same time, as we did not find significant difference in CUS between the Mumbai and nonlocal students of all professional years, the key factor is previous exposure to formal computer training. We could not find comparable studies in India linking the factor of teaching of computer as a subject in school years. The study had the limitation of finding the variation in quality of this teaching in past but an attempt was made to identify the perceived satisfaction about it which showed that all is not well.

**CONCLUSION**

Developing human resource having proficient skills in use of health informatics is the challenge for Indian medical educationists in this century. The medical field is getting revolutionized with the advents in the field of not only the medical sciences but also in information technology. In view of improving the skills of future health professionals, the use of computers should be an integral part of medical curriculum in India. There is an urgent need of designing structured formal curriculum in medical informatics to be taught in preclinical years. Though this is debatable in view of teaching time constraints of 1st professional, the database handling, an important but neglected skill for tomorrow’s health professionals, needs special attention.

The CAL needs to be introduced in medical teaching technology in India. As our study shows that most of our medical students from all the parts of country are now well equipped to face this change. The medical colleges in India should have e-libraries with easy access to students. Some of the premier institutes in public sector and many private medical schools have already developed these but making it a mandatory norm by the medical council of India will initiate the IT revolution in medical education in India.

**REFERENCES**