

RESEARCH ARTICLE

Knowledge and perspective on the application of computer and Internet in medical curriculum among first-year medical students

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ABSTRACT

Background: Medicine comprises a vast base of knowledge. Computer usage and Internet accesses can serve as the best means of gaining information related to Medical journals, research and diagnosis papers, important medical documents, and reference books. **Aim and Objective:** The aim of the study was as follows (1) to estimate the knowledge of medical students on computer and Internet; (2) to estimate the extent and purpose of computer and Internet usage; (3) to identify factors that encouraged the students to use computer and Internet; and (4) to assess the need for incorporating computer and Internet in the medical curriculum. **Materials and Methods:** Around 309 1st-year medical students of SRM Medical College in the year 2014-17 took part voluntarily in a prospective, cross-sectional, and questionnaire-based study. The questionnaire collected information on their computer knowledge, Internet usage patterns, knowledge about information technology, and barriers for using it. Data were entered in Microsoft Excel and appropriate statistical tests were applied for analysis. **Results:** Majority of the students around 93.2% were using computer and Internet with respect to the knowledge on computers, the overall total score was found to be 58.7%, knowledge on hardware was 64%, software being 53.9%, and knowledge on Internet was found to be 58.3%, respectively. The students used computer predominantly for entertainment (82%), preparing presentation (63.5%), and word processing (43%). Only a few have used it for advanced functions such as database management (36.5%). The purpose of Internet usage among the students was 73.1% entertainment, 66% email, 65% education, 30.7% for recent advances, and 24.3% for literature. Nearly 88.1% of the students have agreed for the need of integrating computer education in medical curriculum. The reason for preferring Internet for medical information is that 44% of them have agreed that it gives information on recent trends and latest advances, 23.6% agree that it is time saving, 36.2% agree that it is easily accessible, and 5.8% agree that it is cheaper than the printed materials. **Conclusion:** The data obtained indicate that majority of medical students used computer and Internet, though their overall knowledge on the above was seen to be average. Furthermore, a reasonably good number of students were using it for medical education and most of them wanted to implement in the medical curriculum. This justifies the need to incorporate computer and Internet technology into the existing medical curriculum.

KEY WORDS: Computer Usage; Internet Application; Medical Students

INTRODUCTION

As the present era is of science and technology, computer usage and Internet knowledge are important to gain information in the field of medicine. This study was done to enlighten the perspective and implications of computer among medical students with the objective to assess the use and need of

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computer among them. Computer usage has enhanced the learning process in a number of ways such as computer-based lecture, simulation and intelligent tutoring system, simple drill, and practical application.^[1] It also improves the performance of written assessment, multiple-choice questions, and objective structured clinical examination.^[2,3] It also develops problem-solving skills, knowledge,^[4] and greatly enhances student's satisfaction.^[5] Further computer literacy is high in developed countries compared to developing countries due to poor resources.^[6] Furthermore, studies from southern India shows that student's show poor development of knowledge acquisition skill.^[7] Thus, computer literacy is a must to improve core competency in modern medicine which should commence during the initial stages of the undergraduate curriculum.

In the past 2 decades, the global Internet using the population has grown to almost 2.5 billion^[8] and the students in medical school who are of the millennial generation are using Internet for medical information.^[9] It has a diverse role in medical information such as teaching of organs, diagnosis of diseases, learning clinical examination, and conduct of medical information.^[10-12] It has also been used as an important source of information for medical research and in updating medical information.^[13] Thus, this cross-sectional study examines the level of computer literacy, patterns of computer usage, knowledge and skill of Internet, and their application as an educational tool and to explore their attitude regarding the role of computer in medical education among the 1st-year medical students of SRM Medical College.

Furthermore, the Association of American Medical College belief is that "to practice medicine in the 21st-century medical students must be given a strong grounding in the use of computer technology to manage medical information, support patient care decision, select treatments, and develop their abilities as lifelong learners."^[14] Today, many medical schools require students to purchase computers and others are developing strategies integrating medical informatics into the curriculum. Over the last several years, studies have shown that the use of computer and Internet information by medical professionals can improve the quality of care, enhance the use of evidence-based treatments, and maintain and update knowledge.^[8,9]

Internet has become the world's biggest library for medical information, with India gaining the third-largest position,^[15] where the retrieval of scientific resources can be done within minutes.^[1] Further, it can also be used for interactive sessions in the form of webinars and different online courses. With the fast development of network construction in universities, the number of students using Internet is increasing enormously. Furthermore, computer knowledge and Internet-based training have become a vital part of the Medical Education unit in most of the universities.^[1,16] In India, computer and Internet usage is rapidly increasing, especially in students.

Furthermore, the use of Internet is cost-effective and fast. Further, there are only very few studies that focus on the above among undergraduate medical students. Therefore, the current study was carried out to find out the computer and Internet usage among medical students.

MATERIALS AND METHODS

Study Participants and Sampling

A cross-sectional descriptive study was conducted among the 1st-year MBBS students of SRM Medical College, Hospital and Research Institute between 2014 and 2017. A total of around 309 student participants voluntarily took part in the study. Data collection was carried out using a self-administrated questionnaire covering the following elements:

1. Computer availability: The accessibility to computer, the frequency of using computer, and economic implication of computer ownership
2. Computer skills: Questions were designed to assess the basic computer skills as dealing with files, directories, assessing security, protection, copying, and moving of files. Furthermore, it assessed skills related to using different software to tabulate, calculate, and handling data, creating presentation and graph
3. Internet usage: Questions were designed to assess the usage of Internet and email (entering, sending, receiving, and identifying email) different Internet usage including operation of browser
4. Web navigation: Frequency and duration of navigation, sites being navigated and for what purpose, recently downloaded any medical-related article, number of known medically labeled website
5. Telemedicine: Regarding the utilities needed to set up a telemedicine unit, in which medical domain is it useful and to name two of them functioning in the country
6. Attitude toward using computer and Internet for medical education was determined using statements containing items about its necessity in medical education, computer-based lecture, and examination versus traditional method
7. Furthermore, the logistics barrier for using computer and Internet was assessed.

Data Analysis

Data obtained were coded and entered using SPSS software version 19. Data were summarized using mean and standard deviation for quantitative variables and percentages for qualitative variables.

Ethical Considerations

Ethical clearance was obtained from the institutional ethical committee board. Furthermore, informed consent was obtained from all the students after the proper orientation of the subjects regarding the objectives of the study and the data

confidentiality. Further, the impact of the study was respected and maintained.

RESULTS

Computer Access, Knowledge, and Usage

Around 309 students' voluntarily participated in the study. The majority of the students owned a computer ($n = 288$, 93.2%), of which 58.2% owned a laptop and 35% owned a desktop. With respect to the knowledge on computers, the overall total score was found to be 58.7% (with a score being 13.5 out of 23); knowledge on hardware was 64% and software being 53.9%, respectively [Table 1]. The students used computer predominantly for entertainment (82%), preparing presentation (63.5%), and word processing (43%). Only a few have used it for advanced functions such as database management (36.5%).

Internet Knowledge, Access, Frequency, Purpose, and its Role in Medical Education

The knowledge on Internet was found to be 58.3% (with a score being 5.25 out of 9) [Table 1]. Around 90% of the students had Internet connections. Out of this, 54.4% had broadband connections and 42.9% had wireless connections, the remaining were unsure. Although most of the students had Internet connection, their primary places of Internet access were 63.8% in home, 11% in the library, and 5.5% in the cyber cafe and the remaining in all the three places. The purpose of Internet usage among the students was 73.1% entertainment, 66% email, 65% education, 30.7% for recent advances, and 24.3% for literature search [Figure 1]. The frequency of Internet access varied among the students; 55.7% used it daily, 21.7% twice a week, 13.3% once a week, and 5.5% once a month [Figure 2]. Furthermore, the duration spent varied among the students 47% used it for 30–60 min, 42.3% <30 min, 25.6% for 1–2 h, and 10.3% more than 2 h. The amount spent for Internet usage on an average is 500 rupees per month. Around 94.2% of the students have an email account, of which 83.5% have Gmail account, 24.7% Yahoo account, 11% Hotmail, and 2% Rediff account. The commonly used Internet browsers are Google chrome 61.8%, Internet explorer 21%, and 20.4 Mozilla. The commonly browsed sites for medical-related queries are goggle 92.2%, 3.9 Yahoo, and 3.6 PubMed, of which 49.2% of students have

downloaded medical related articles. Furthermore, the study shows that 63.4% of students have a Webcam and 55.3% of them have participated in video conferencing or video chat. With respect to gaining knowledge on medical information, 65.4% is from textbooks, 28.8% from the Internet, 9.7% class notes, 6.8% e-book, and 5.2% from journals, respectively. Further, the reason for preferring Internet for medical information is that 44% of them have agreed that it gives information on recent trends and latest advances, 23.6% agree that it is time saving, 36.2% agree that it is easily accessible, and 5.8% agree that it is cheaper than the printed materials [Figure 3]. Nearly 88.1% of the students have agreed for the need of integrating computer education in the medical curriculum.

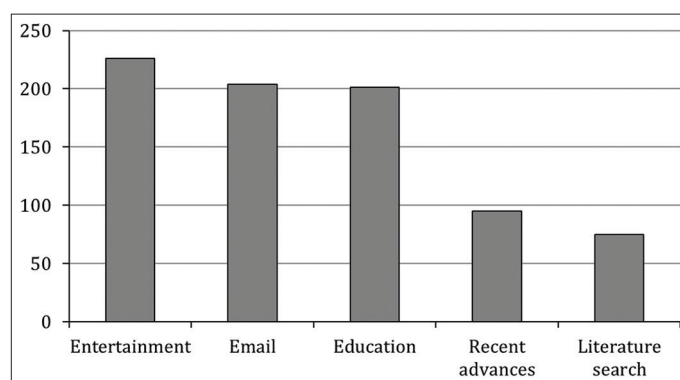


Figure 1: Purpose of Internet usage

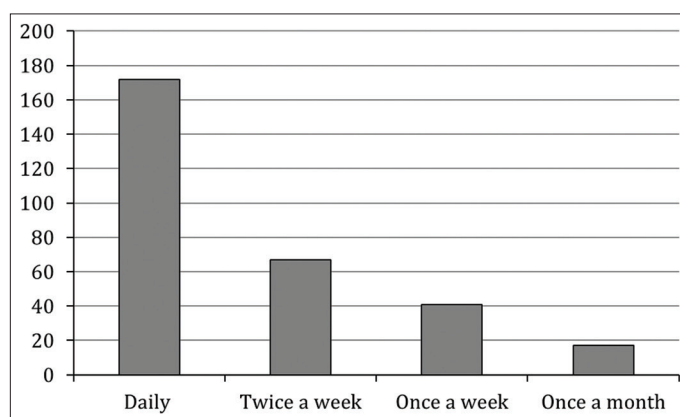


Figure 2: Frequency of Internet usage

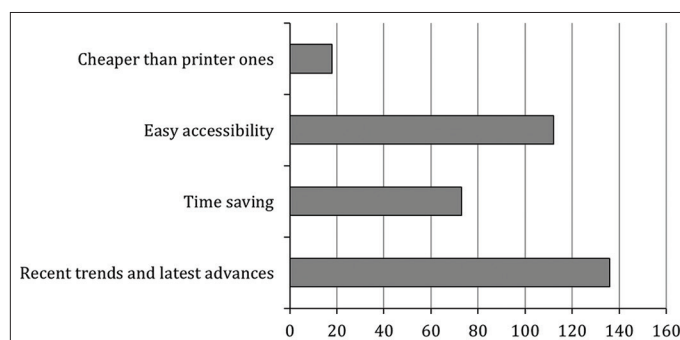


Figure 3: Reason for preferring Internet for medical education

Table 1: Knowledge score on computer and Internet

Components	Total score	Mean score	Percentage score
Total knowledge score	23	13.50	58.7
Knowledge on hardware	7	4.48	64.0
Knowledge on software	7	3.77	53.9
Knowledge on Internet usage	9	5.25	58.3

Knowledge on Telemedicine, Evidence-based Medicine, and e-Health

Around 21.4% of the students are aware of telemedicine, 80.8% are aware of evidence-based medicine, and 41.1% are aware of eHealth.

Logistic Barriers for Computer and Internet Usage

The students have quoted some potential barriers in incorporating computer education in the medical curriculum such as 160 number of students have agreed that there is lack of time in using computer or Internet, 172 have told that it disrupts studies and working space, 105 have agreed that the cost of using is high, and 79 have told that it is not user friendly [Table 2].

DISCUSSION

In the recent millennial era of connectivity, knowledge about computer and Internet skills to enhance medical learning is of utmost importance.^[17] The easy availability of computers and the accessibility to the Internet has become important for undergraduate medical students to develop a vital competency in computer and Internet usage with respect to medicine and medical field.^[18] Hence, students get engaged themselves in the World Wide Web enable them to widen their knowledge^[19] and enhance their skills in the medical field so that they can practice up-to-date and evidence-based medicine, which in turn is essential to improve the quality of medical care.^[20] In our study, around 96% of the students owned their own computer and 86% of them had Internet connection which is well above than the other studies conducted such as the United Kingdom 84%,^[21] Nigeria 80%,^[13] Saudi Arabia 94%,^[10] Finland 95%,^[12] and Malaysia 61%.^[22] Studies in developed countries indicated that computer literacy-focused mainly on Internet application, which has proved the same in our study as well. A great variation was noted with respect to computer skills among medical students around the world. Students survey in our study reported that word processing skill was 41%, email 97%, and Internet usage 85% which was much more above the studies conducted in Nigeria, Malaysia,^[13,22] and Tanzania.^[23] In spite of great access to computer and Internet most of the students navigate web for medically irrelevant reasons. Predominantly 75% of students use it for entertainment, 68% email, 67% education, 32% for recent advances, and 25% for

literature search. Thus, web navigation for medical education and self-learning was found to be deficient as in accordance with other studies like a previous study conducted from India.^[7] It is seen that around 67% have a webcam and 59% have participated in video conference and video chat.

With respect to the frequency of Internet usage, 57% use it on a regular basis, 22% twice a week, 14% once a week, 6% once a month, and 4% not at all showing that frequency used in our studies is comparatively higher than the other previous studies like Saudi Arabia.^[8] Furthermore, a longitudinal study from Denmark revealed that 80% of the students used Internet daily and 90% used it for email.^[24] In our study, around 97% of them use email, the values of which are comparatively higher than the other previous studies. Regarding email account, 81% have it in Gmail, 24% in Yahoo, 11% in Hotmail, and 6% in Rediff. The common browser used is Google chrome 65%, Internet explorer and Mozilla around 22% each. With respect to the time spent on Internet per day, 37% spend around 30–60 min, 33% spend <30 min/day, 20% spend 1–2 h, and 8% more than 2 h. The average amount spent for Internet per month is around 500 rupees. The common sites browsed by the students for medical-related queries are Google 97%, Yahoo, and PubMed 4% each. Around 52% of the students have downloaded medical articles. However, with respect to gathering medical information majority of them around 67% gather from textbooks, 30% from Internet, 10% from class notes, 7% from e-books, and 5% from journals. The reasons quoted by the students for preferring Internet as a source of medical information are 45% have told that it gives information on recent trends and latest advances, 37% said that it is easily available, 24% quote that it is time saving, and 6% tell that it is easily available, in comparison to a study by Kadam *et al.*^[25] which showed that 92.4% used for time saving and 92.8% for the latest knowledge.

With respect to knowledge on telemedicine, around 41% of students have agreed that they have knowledge on it and have also agreed that it will be useful in the medical field whereas knowledge on eHealth is very poor. Around 63% have knowledge about evidence-based medicine. Further, 76% of the students have agreed the need for integrating computer education in the medical curriculum in a similar comparison study to 68.40% conducted by Kadam *et al.*^[25]

Further, the students have also rated some potential barriers in incorporating computer education in medical curriculum such as lack of time to use the computer or Internet, disrupts studies, and working space, cost is high and not user friendly.

Limitation

The study was conducted only among the 1st-year medical students in our college. Therefore, it does not represent the population. As it's a questionnaire-based study, there can be recall bias by the participants.

Table 2: Potential barriers of Internet usage

Statement	Strongly agree	Agree	Disagree	Strongly disagree
L1 (n=210)	58 (27.7)	108 (51.4)	36 (17.1)	8 (3.8)
L2 (n=216)	48 (22.2)	124 (57.4)	29 (13.5)	15 (6.9)
L3 (n=186)	20 (10.8)	85 (45.7)	46 (24.7)	35 (18.8)
L4 (n=177)	19 (10.7)	60 (33.9)	54 (30.5)	44 (24.9)

Figures in parenthesis indicate percentage

CONCLUSION

Our study concludes that the majority of the students are using computer and Internet, with a good number of them using it for medical information. Thus, the medical curriculum supervisors and medical trainers should consider it seriously for implementing in the current medical educational programs. Further, these skills will help to reduce the anticipated problems of students working on theses. Furthermore, computer and Internet use by medical teachers during teaching activities may encourage students to make greater use of electronic information resources.

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