Computer Use Among Post Graduate Dental Students in India

Gupta P[1], Gupta SG[2], Ankola AV[3], Jindal V[4]

ABSTRACT

Objective: Computers have become an integral component of dentistry finding application in both patient care and dental education. Few studies have been conducted to assess the use of computers in the field of dentistry in India. The present study was conducted to assess the knowledge, skills, practice and attitudes of post graduate dental students towards the use of computers in dentistry.

Subjects and Methods: A self administered questionnaire was distributed among the post graduate dental students of KLE University, Belgaum, India. 68 out of 82 students responded, the data was analyzed and represented as frequency and percentage.

Results: Most of the students acquired knowledge about computer through informal training. Internet use was very high among the students. They could perform basic operations on computer but faced problem in some advanced functions like hardware maintenance, software installation, use of spreadsheets and photo editing. 73.5% used computer in both home and college. More than 75% owned their own computer. Only 41.2% felt they were well trained to use computers. More than 90% believed that computer education should be a part of dental curriculum.

Conclusion: Though computers in being extensively used by the post graduate dental students, they lack formal training and feel the need for the same. Computer training will be helpful in creating better dental professionals.

KEY WORDS : Dental education, Post graduate students, Computer literacy, Attitude, Skill, Knowledge, practice

[1] Lecturer,
Department of Community Dentistry,
Government College of Dentistry,
Indore, Madhya Pradesh, India.

[2] Reader,
Department of Prosthodontics,
Index Institute of Dental Sciences,
Indore, Madhya Pradesh, India.

[3] Professor and Head,
Department of Public Health Dentistry,
KLEVK Institute of Dental Sciences,
Belgaum, Karnataka, India.

[4] Director-Principal cum HOD
Department of Periodontology
Himachal Dental College, Sundernagar,
Himachal Pradesh, India.

Contact Author

Dr Puneet Gupta
drpuneetgupta@gmail.com

INTRODUCTION

Computers can be regarded as the greatest invention of science in the present times. It has changed the world in more than one ways. Computing and information technology is the fastest advancing field(1). The speed, accuracy and versatility of computers makes it find application in nearly all areas. Dentistry is one such area where computers have found tremendous use. The use of computers makes work easy for a dentist and treatment comfortable for a patient. The application of computers in dentistry is related to patient education, maintenance of electronic records and databases, communication, information about new products, information to recent dental literature, continuing dental education, settling insurance claims, marketing, quality assurance, digital imaging, teledentistry and many more (2-4).

Computer based dental education is one of the most important application of computers. Computer was introduced for dental education in 1971 at University of Kentucky (2). The introduction of computer in dental education raised the performance of dental students and produced positive changes in students attitudes towards computers and teaching (5,6). Computer is an important tool in all aspects of dental education today (7). Internet based dental education has advantages of easy

access, low cost, minimal paper waste, rapid publication of literature, huge pool of data availability and flexibility of use (8). It is better that the regular didactic teaching method because it allows the students to study the subject at their own pace. It makes understanding of the subject easy.

Computer has an important role to play in the future of dentistry. The amalgamation of principles of dentistry with technological advances in computers will definitely improve the face of dentistry through dental education and patient care. An estimate suggested that by the year 2010, 30% of the physician time will be spent on using information and communication tools (9). Lack of awareness about computers and information technology tools will hamper the effectiveness of dentists (10). Equipment alone is useless unless people are trained to use it (9). Thus it becomes imperative to train the dentists of future to use the computers. Computer training not only provides a professional advantage to the dentist but is also necessary for their personal development (7). Today the use of computers and information technology tools has become necessary for both dental students and professionals (11).

Indian dentists are adequately trained in the field of dentistry and are appreciated for their work in foreign countries. The dental council of India is regularly updating the training program so that the Indian dentists can be at par with those from developed countries. The lack of computer training in dental colleges in India is a set back to the dentists of India. Their counterparts in the western world are well trained to use and utilize the tools of information and technology (8). Inequalities between the developed and developing countries is related to the digital divide which supposed to be more dramatic than inequality of health and income (12).

India has around 300 dental colleges presently which are training more than 25,000 undergraduates every year. Out of the total, more than 100 dental colleges offer post graduate training in the nine branches of dentistry, training around 2,500 post graduate students every year. Thus India contributes to a great amount of dental workforce. A small change in training these dental graduates and post graduates will create a big impact of the course of practice of dentistry tomorrow. Introduction of computer training may have a positive impact in the quality of dentist tomorrow. However the need for such training has to be assessed.

Post graduate dental students of India form an interesting group. They represent the breed of dentists in India who will be defining the future of dentistry not only in India but the whole world. They will be teachers tomorrow and will be training the undergraduate and post graduate dental students. There is an immense amount of pressure on this group. With globalization, they have to compete with dentist from other countries. They have to keep themselves updated with the increasing pool of knowledge like new materials, new techniques and latest dental literature. They have to practice dentistry using the newer and sophisticated tools. Knowledge about computer will definitely make their work easy. It is also necessary to know what skills with regard to use of computer do they possess and what is their attitude towards the use of computers in dentistry. Finally how much is the use of computer practiced by them. The present study was thus conducted with the aim to assess the knowledge, skills, practice and attitudes of post graduate dental students towards the use of computers in dentistry.

METHOD AND MATERIALS
A self administered questionnaire was prepared with 35 questions to assess the knowledge, skills (Basic Operations, Software Handling and Internet Use), practice and attitudes of students towards the use of computers in dentistry. There were 5 questions in each section (except attitudes which had 10 questions). All questions had dichotomous answers as Yes or No (except the practice section which had three options in each question). The students were also asked to mention their age, gender and department to which they belonged in the questionnaire however students were instructed not to write their names to maintain anonymity. The study was conducted among the Post graduate dental students of the KLEVK Institute of Dental Sciences, Belgaum, India. All the students of KLE University, Belgaum present at the time of the study were included. Ethical clearance was taken from the research and ethical committee of the college. The questionnaire was distributed to the students in their respective departments and they were given sufficient time to complete the questionnaire. The questionnaires were collected on the same day by repeated visits to the department so as to get maximum response from the students. A total of 82 questionnaires were distributed and 68 were responded to the study. The response rate was 82.9%. The questionnaire was checked for correctness and the data was analyzed using SPSS for Windows Version 15.0. Mean and standard deviation was calculated for continuous data and frequency and percentage was calculated for categorical data. 95% Confidence interval was constructed. Chi square test was done where applicable. The $p < 0.05$ was set as the level of significance.

RESULTS
The responses were equally distributed among males and females i.e. 34 each. The mean age of the respondents was 25.46 ± 1.2 years. (Table 1)

More than half students had knowledge about computers from the basic training in 10th class equivalent to matriculation. 51.5% (n=35) had studied computer as a subject in 10th however

Table 1: General information about study participants

		Number	Percentage
Gender	Male	34	50%
	Female	34	50%
Department	Oral Medicine & Radiology	5	7.4%
	Periodontics	10	14.7%
	Preventive & Community Dentistry	6	8.8%
	Orthodontics & Dento facial Orthopedics	11	16.2%
	Pedodontics & Preventive Dentistry	2	2.9%
	Oral Pathalogy & Microbiology	6	8.8%
	Conservative Dentistry and Endodontics	8	11.8%
	Prosthodontics including Crown & Bridge	13	19.1%
	Oral & Maxillofacial Surgery	7	10.3%

All the students could start and shut down the computer and also search files and folders using the search function. Nearly all 98.5% (n=67) could create and folders and sub folders and organize their files effectively. 77.9% (n=53) could install simple software but very few i.e. 47.1% (n=32) could maintain their hardware. A score of 1 was given to each positive response and the total score for basic operations was 4.24 ± 0.8 (Table 3).

92.6% (n=63) could effectively use word processing software and create simple documents and 97.1% (n=66) could create presentations. 77.9% (n=53) could create an impact in the presentation by inserting animation into it. Only 41.2% (n=28) could use spreadsheets to create graphs and charts. 61.8% (n=42) could use photo editing software but the use was statistically different among the genders.

only 14.7 % (n=10) and 8.8% (n=6) had studied computer as a subject in 12th and graduation respectively. 67.6% (n=23) of females reported to have studied computer in 10th class as compared to 35.3% (n=12) of males. This difference was statistically different at p<0.05. 36.8% (n=25) students admitted to have attended private computer coaching classes in their free hours to gain knowledge about computers. The majority 86.8% (n=59) have learnt computer from family and friends which indicates that they are not exposed to professional training (Table 2).

Table 2: Knowledge about computers

Question	Number G[95% CI]	Percentage [95% CI]
I have studied computer as subject in 10th / matric / high school	35 [31 – 39]	51.5% [45.5 % - 57.4%]
I have studied computer as subject in 12th / intermediate	10 [8 - 12]	14.7% [11.7% - 17.7%]
I have studied computer as subject in BDS	6 [5 – 7]	8.8% [6.9% - 10.7%]
I have done a course in computer from a private institute	25 [21 – 29]	36.8% [31.2% - 42.3%]
I have learnt computer from any friend or family member	59 [57- 61]	86.8% [84.0% - 89.5%]

Table 3: Software Skills – Basic Operations

Question	Number G[95% CI]	Percentage [95% CI]
I can start and shut down a computer	68 [68 – 68]	100% [100% – 100%]
I can create folders / sub folders and organize my files	67 [67 – 67]	98.5% [98.2% - 98.9%]
I can locate files in computer using search	68 [68 – 68]	100% [100% – 100%]
I can install simple software	53 [50 – 56]	77.9% [73.9% - 82.0%]
I can maintain my hardware	32 [28 – 36]	47.1% [41.1% - 53.0%]

76.5% (n=26) males could edit photos as compared to 47.1% (n=16) females. The total score for software handling was 3.71 ± 1.2 (Table 4).

All the students could connect to the internet and send and receive mails. 92.6% (n=63) could send files as attachment using the internet and 94.1% (n=64) could chat with family and friends using the internet. 98.5% (n=67) could search material on the internet. The total score for internet use was 4.85 ± 0.5 (Table 5).

20.6% (n=14) use computer in college/ university only, 5.9% (n=4) in room/ home only and 73.5% (n=50) at both home and college. 23.5% (n=16) don't own a computer. 17.6% (n=12) own a desktop, 45.6% (n=31) own a laptop and 13.2% (n=9) own both a laptop and a desktop. 42.6% (n=29) use com-

puter daily, 19.1% (n=13) check their e-mail daily and 16.2% (n=11) use computer for educational purposes daily. Only 2.9% (n=2) use computer rarely, 8.8% (n=6) check their e-mail rarely and 7.4% (n=5) use computer for educational purposes rarely (Table 6).

Only 5.9% (n=4) consider that computer is just for fun. All students consider computer to be a boon to dental academics, 98.5% (n=67) consider computer make life easy and internet can be useful in searching information. 97.1% (n=66) believe e-mail makes communication easy and 92.6% (n=63) believe that basic computer training should be a part of dental education. 95.6% (n=65) also believe that advanced computer training should be provided to those interested. Only 41.2% (n=28) believed that they were well trained to use computers. 60.3% (n=41) believed

that typing on computer is better than writing on paper and 47.1% (n=32) believed that dental college should follow an electronic format for education and patient management (Table 7).

DISCUSSION

The present study conducted on a small group of post graduate dental students can be considered as a pilot project to evaluate the current status of use of computers among Indian dentists. Very few studies have been done with regard to use of computers in dentistry and so this study provides some basic information based on which the future studies may be done. The purpose of this project is to identify the need for incorporation of computer in dental curriculum in India.

Most of the students (51.5%) had acquired basic computer knowledge

Table 4: Software Skills – Software Handling

Question	Number G[95% CI]	Percentage [95% CI]
I can use word processing software to create simple documents	63 [62 – 64]	92.6% [91.0% – 94.3%]
I can use power point to make presentations	66 [66 – 66]	97.1% [96.4% - 97.7%]
I can insert animation into power point	53 [50 – 56]	77.9% [73.9% - 82.0%]
I can use spreadsheet like excel to create graphs and charts	28 [24 – 32]	41.2% [35.4% - 46.5%]
I can use photo editing software to edit photographs	42 [38 – 46]	61.8% [56.2% - 67.4%]

Table 5: Software Skills – Internet Use

Question	Number G[95% CI]	Percentage [95% CI]
I can connect to internet	68 [68 – 68]	100% [100% – 100%]
I can send and receive e-mail	68 [68 – 68]	100% [100% – 100%]
I can send and receive attachment files via e-mail	63 [62 – 64]	92.6% [91.0% – 94.3%]
I can chat with others on internet	64 [63 – 65]	94.1% [92.8% - 95.4%]
I can search material on internet	67 [67 – 67]	98.5% [98.2% - 98.9%]

from 10th class. After 10th they were not exposed to the any formal training in computer. Though 36.8% had done some form of training from private computer training institutes, the majority (86.8%) gained the knowledge about computer from family and friends. Similar finding was reported where 27.3% Greek post graduate students had attended computer classes (11). Thus there is an inadequate formal training. There is lack of certification which can provide confidence to the students. There is no authentication of the knowledge which they have. Self learning was reported to by 95.2% medical post graduate students of south India as means of acquiring computer

knowledge. 4.7% of them had attended classes and 16.7% read manuals (13). Such training allows the students to use computers without basic knowledge. The learning is mainly by trial and error. "Necessity is the mother of invention" and the necessity to use computers forced the students to acquire the knowledge through means available and convenient.

The post graduate students are subjected to rigorous training during the three years. They are supposed to present seminars, journal clubs, case summaries etc in the college and papers at scientific meetings. The students are supposed to use computers for these

activities. Similar high use of computer among post graduates has been reported among south Indian medical students (13). The students have learnt to perform all the basic functions very well. The students faced problem in installing software and maintaining hardware. The reason can be lack of formal training and scarce knowledge about the functioning of computer. The students also faced problem in some advanced software functions like inserting animation to presentation, creating graphs and charts and photo editing. The post graduate student may need to use these functions during the training for different reasons and thus there is a need to train them to use these

Table 6: Practices regarding computers			
Questions		Number [95% CI]	Percentage [95% CI]
I use computer in	College	14 [11 – 17]	20.6% [16.7% - 24.5%]
	Hostel / Home	4 [3 – 5]	5.9% [4.6% - 7.2%]
	Both	50 [47 – 53]	73.5% [68.9% - 78.2%]
I own	Desktop	12 [10 – 14]	17.6% [14.2% - 21.1%]
	Laptop	31 [27 – 35]	45.6% [39.7% - 51.5%]
	Both	9 [7 – 11]	13.2% [10.5% - 16.0%]
	None	16 [13 – 19]	23.5% [19.3% - 27.8%]
I use computer	Daily	29 [25 -33]	42.6% [36.8% - 48.5%]
	Often (few times a week)	37 [33 – 41]	54.4% [48.5% - 60.3%]
	Rarely (few times a month)	2 [2 – 2]	2.9% [2.3 – 3.6%]
I check my e-mail	Daily	13 [11 -15]	19.1% [15.4% - 22.8%]
	Often (few times a week)	49 [46 – 52]	72.1% [67.3% - 76.8%]
	Rarely (few times a month)	6 [5 – 7]	8.8% [6.9% - 10.7%]
I use internet to check for academic information	Daily	11 [9 – 13]	16.2% [13.0% - 19.4%]
	Often (few times a week)	52 [49 – 55]	76.5% [72.2% - 80.7%]
	Rarely (few times a month)	5 [4 - 6]	7.4% [5.7% - 9.0%]

advanced features. Internet has become very popular and students very using this facility for communication and academic reference. Use of internet for non academic purposes has also been reported (14). This group of students were shown to use internet more than Turkish undergraduate students.15 Though the study shows high skills among the students there may be an overestimation as has been reported in other studies (16).

The pressing academic demand makes the majority of the students (73.5%) computer both at home and college. More than 3/4th of the students own their own computers. The rest may use free computer access of the college or library. A study among Greek Post graduate students showed that 8% owned laptop only, 54.5% desktop only and 27.3% both laptop and desktop (11). The use of laptop is more common among Indian post graduates due to the portability. Few US dental schools have introduced mandatory laptop programs where laptops are provided to students with all required

software at a cheaper rate (17). Such initiative may be highly successful in India looking at the number of dental students who are opting for laptops. Most of the students use computer, check e-mail and search for education material few times a week. Thus computer is finding good use among this group of students. Study among dental students of a US university showed that 12.6 hours per week was spent on computers during college for academic purposes (18).

94% believed that computer is not just for fun but has good use in academics. This implies students are not using computer for recreation but for educational purposes. Students also realize how computers has made life easy for us and it's importance in dental education. Less than half of the students were confident in using computers. They felt that they are not well trained to use computer. This is due to the lack of formal training which makes the students feel that there is a deficiency is there knowledge about computers. More than 90% students believed that

computer training should be provided in dental colleges. A basic level of training is necessary for all and advanced training for those who want. The busy schedule does not allow the students to train themselves in computers but most of them are eager to acquire knowledge if provided a chance.

The study showed that females were as good as males in using computers except for the use of photo editing software. This is shows there is no gender discrimination in computer training among males and females, the latter utilizing the development in technology to the best. Study in turkey reported males to be using internet more than females. Report from US states that the disparity in knowledge about computers between males and females diminished between 1990 and 1993 (15). Indian female dental students are performing as good as their US counterpart with respect to be equal to males in the computer use. Similarly more male dental undergraduate students from Jordan felt competent with basic IT skills but no such difference

Table 7: Attitude towards the use of Computers		
Question	**Number** **G[95% CI]**	**Percentage** **[95% CI]**
Computers make life easy	67 [67 – 67]	98.5% [98.2% - 98.9%]
Computer is an boon to academics	68 [68 – 68]	100% [100% – 100%]
Computer is just for fun	4 [3 – 5]	5.9% [4.6% - 7.2%]
Internet can be very useful for searching information	67 [67 – 67]	98.5% [98.2% - 98.9%]
e-mail makes communication easy	66 [66 – 66]	97.1% [96.4% - 97.7%]
Basic computer training should be a part of dental education	63 [62 – 64]	92.6% [91.0% – 94.3%]
Advanced computer training should be made accessible to those who are interested by the college	65 [64 – 66]	95.6% [94.6% - 96.6%]
I am well trained to use computers	28 [24 – 32]	41.2% [35.4% - 46.9%]
Typing on computer is easy than writing on paper	41 [37 – 45]	60.3% [54.6% - 66.0%]
College should adopt electronic format for academics and patient management	32 [28 – 36]	47.1% [41.1% - 53.0%]

was noticed among the present study showing females equally competent (2). A similar study among Greek post graduate students also showed higher computer literacy scores among males (11).

It was reported that there is that lack of computer knowledge during secondary education in Europe. It was suggested that basic computer knowledge should be pre requisite to admission in dental schools (3). India recognizes the importance of computer training. Students of class 10th are being taught basic computers. Lots of private training institutes throughout the country provide both basic as well as advanced training in computer. However most of the students taking dentistry as a profession are exposed to only basic computer training before joining the dental college as compared to students taking engineering or other branches. The students concentrate more on the studying life sciences. The pre medical and pre dental examinations conducted over various colleges of India include questions on Physics, Chemistry and Biology. Certain dental colleges include English and Current affairs questions but none of the dental colleges check the knowledge of computers as a criterion for admission to medical and dental courses. The post graduate admission is based on questions on topics of dentistry. Incorporation of few questions on computer sciences in such examination may create a positive change.

The dental council of India has not recognized the importance of inclusion of computers in dental curriculum. Few dental colleges have organized courses on computers for the benefit of their students and faculty. American association of dental schools has approved incorporation on computer training as a fundamental part of syllabus (19). General medical council, UK has recommended optional modules to increase computer literacy among medical professionals (13). Japan offers

a total of 788 hours for general educational courses which includes training in computer science (20). In Jordan all schools provide mandatory basic computer training to the students and all teaching staff is required to obtain a Jordan University Computer Driving License (2). Even short term training programs have shown to increase the knowledge of computers among students (9).

When computers were first introduced into dental practice, it was managed by outside service providers (4). Major advances in computers are targeted towards making in user friendly. With the introduction of graphic user interface, computers have become a house hold necessity now. It is being used but not studied. This may manifest as day to day problem in handling. Few hours of computer training during dental education may save a lot of trouble caused due to inadequate handling of computer during life time of dental practice.

We live in the age of internet. Finding dental education information is easy on the internet (21) and is also the most preferred place to search for information, updates and recent advances with respect to dentistry (22). However still there is a digital divide among the students (23). Certain students are comfortable to use internet and computers whereas there a lot many who are not. India is lagging behind from the western world in computer use (21). Thus it is also important to target groups and improve them to get them at par with other students. In times to come dental education may totally shift on computers. Online tests will be used to evaluate students (24) because it provides uniform evaluation without any intra examiner bias (25).

CONCLUSION
Though the Indian dental students are using computers, they feel the need for inclusion of computer training in the dental schools. It is time the Dental

Council of India conducts need assessment and includes computer training program for both under graduate and post graduate dental students. The present study is done on a small scale. More studies in this field involving more number of dental colleges from different parts of India and involving students from different years of study is required. Examination may be shifted to using computer based systems. Based on further research the necessary steps may be taken to improve the quality of Indian dentist, so that they are competent with dentist of developed countries.

REFERENCES
1. Eisner J. The application of Computers to accreditation. J Dent Educ. 1997 June;61(6):493-500.
2. Rajab LD, Baqain ZH. Use of information and communication technology among dental students at the University of Jordan. J Dent Educ. 2005 Mar;69(3):387-398.
3. Mattheos N, Nattestad A, Schittek M, Attström R. Computer literacy and attitudes among students in 16 European dental schools: current aspects, regional differences and future trends. Eur J Dent Educ. 2002 Feb;6(1):30-35.
4. Heiert CL. Computer use by dentists and dental team members. J Am Dent Assoc. 1997 Jan;128(1):91-95.
5. Rosenberg H, Grad HA, Matear DW. The effectiveness of computer-aided, self-instructional programs in dental education: a systematic review of the literature. J Dent Educ. 2003 May;67(5):524-532.
6. Gupta B, White DA, Walmsley AD. The attitudes of undergraduate students and staff to the use of electronic learning. Br Dent J. 2004 Apr 24;196(8):487-492.
7. Mattheos N, Schittek MJ, Nattestad A, Shanley D, Attström R. A comparative evaluation of computer literacy amongst dental educators and students. Eur J Dent Educ. 2005 Feb;9(1):32-36.
8. Marya CM, Marya KM. Internet availability and e-education in North Indian Dental Colleges : A Distant Dream? J Dent Educ. 2007 April;71(4):445-446.
9. Samuel M, Coombes JC, Miranda JJ, Melvin R, Young EJ, Azarmina P. Assessing computer skills in Tanzanian medical students: an elective experience. BMC Public Health. 2004 Aug 12;4:37.
10. Ahsan A, Paravatty RP, Vengal M, Bastian TS. Computer awareness amongst dental students – A Survey. J Indian Dent Assoc. 2001 Oct-Dec;72: 354-355.
11. Divaris K, Polychronopoulou A, Mattheos

N. An investigation of computer literacy and attitudes amongst Greek post-graduate dental students. Eur J Dent Educ. 2007 Aug;11(3):144-147.

12. Edejer TT. Disseminating health information in developing countries: the role of the internet. BMJ. 2000 Sep 30;321(7264):797-800.

13. Inamdar SC, Rotti SB. Computer use among medical students in an institution in southern India. Natl Med J India. 2004 Jan-Feb;17(1):8-10.

14. Walmsley AD, White DA, Eynon R, Somerfield L. The use of the Internet within a dental school. Eur J Dent Educ. 2003 Feb;7(1):27-33.

15. Komerik N. Use of the Internet among dental students in Turkey. J Dent Educ. 2005 Apr;69(4):470-475.

16. Link TM, Marz R. Computer literacy and attitudes towards e-learning among first year medical students. BMC Med Educ. 2006 Jun 19;6:34.

17. Hendricson W, Eisenberg E, Guest G, Jones P, Johnson L, Panagakos F, McDonald J, Cintron L. What do dental students think about mandatory laptop programs? J Dent Educ. 2006 May;70(5):480-499.

18. Spallek H, Etzel KR, Maher BS. Dental school applicants' use of website information during the application process. J Dent Educ. 2005 Dec;69(12):1359-1367.

19. Castelló-Castañeda C, Ríos-Santos JV, Bullón P. Analysis of the knowledge and opinions of students and qualified dentists regarding the use of computers. Med Oral Patol Oral Cir Bucal. 2008 Jan1;13(1):E71-76.

20. Komabayashi T, Raghuraman K, Raghuraman R, Toda S, Kawamura M, Levine SM, Bird WF. Dental education in India and Japan: implications for U.S. dental programs for foreign-trained dentists. J Dent Educ. 2005 Apr;69(4):461-469.

21. Marya CM, Marya KM, Dahiya V, Juneja V, Gupta P. Internet usage among dental students in north India. J Pak Med Assoc. 2013 May;63(5):628-629.

22. Jali PK, Singh S, Babaji P, Chaurasia VR, Somasundaram P, Lau H. Knowledge and attitude about computer and internet usage among dental students in Western Rajasthan, India. J Int Soc Prev Community Dent. 2014 Jan;4(1):29-34.

23. Mariño R, Habibi E, Morgan M, Au-Yeung W. Information and communication technology use among Victorian and South Australian oral health professions students. J Dent Educ. 2012 Dec;76(12):1667-1674.

24. Neuhaus KW, Schegg R, Krastl G, Amato M, Weiger R, Walter C. Integrated learning in dentistry: baseline data and first evaluation at the Dental School of Basel. Eur J Dent Educ. 2008 Aug;12(3):163-169.

25. Abe S, Kawada E. Development of computer-based OSCE re-examination system for minimizing inter-examiner discrepancy. Bull Tokyo Dent Coll. 2008 Feb;49(1):1-6.