Original article

Assessment of digital literacy and use of smart phones among Central Indian dental students

Payal Saxena^a, Saurabh Kumar Gupta^{a,*}, Divya Mehrotra^b, Shivam Kamthan^c,
Husain Sabir^d, Pratibha Katiyar^e, S.V. Sai Prasad^f

^a Department of Conservative Dentistry, Government College of Dentistry, Indore, Madhya Pradesh 452001, India

^b Department of Oral and Maxillofacial Surgery, King George's Medical University, Uttar Pradesh, India

^c Department of Social and Preventive Medicine, Subharti Medical College, Meerut, Uttar Pradesh, India

^d Raj Multispeciality Centre, Indore, Madhya Pradesh 452001, India

^e Department of Prosthodontics, Career Dental College and Hospital, Lucknow, Uttar Pradesh, India

^f Indian Agricultural Research Institute-Regional Station, Indore, Madhya Pradesh, India

ARTICLE INFO

Article history:

Received 19 December 2016

Received in revised form 29 September 2017

Accepted 3 October 2017

Available online 5 October 2017

Keywords:

Dental education

Digital literacy

Smartphone

E-learning

ABSTRACT

Objectives: Education has largely been digitalized. More so, for professional education, keeping updated in this fast paced world has become a necessary requisite and dentistry has not been left untouched. This cross sectional questionnaire based study aimed to assess the digital literacy and smartphone usage amongst the 260 Central Indian dental students including their perspicacity about smartphone/internet usage for learning purposes. The students' attitude for implementation of digital technology in study programs/education system was also evaluated.

Methods: The questionnaire was distributed among total 260 dental students from different dental institutes of Central India. The data was collected and analyzed using SPSS software.

Results: Out of 260 students, 250 were internet users, out of which 56% had internet access all time. 94.23% students owned a smartphone. 46.53% (114/245) students had some app related to the dentistry in their smartphone device. The commonest site for surfing related to knowledge seeking was google scholar (72%) followed by Pubmed and others. Nearly 80% dental students believed that social media helps them in their professional course studies. Post graduate students showed statistically significant difference from undergraduates and interns in terms of knowledge of keywords, dental apps and reading research journals. 89.23% students were keen for implementation of e-learning in their curriculum.

Conclusion: This study reflects willingness of dental students to adopt digital revolution in dental education which in turn may present an opportunity for educators and policy makers to modify educational methods and thereby advance student's current learning approaches.

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1. Introduction

Education system plays a critical role in development of any society. It should be continuously adaptive and dynamic to keep pace with growing trends.¹ In recent times, information/digital and communication technology has become an integrated part of every educational and professional field including dentistry. Most of the improvements and breakthroughs are compiled and presented in digital medium much before their hard copy is available and inclusion of such advancements take months or even years to get incorporated into standard text books. Undoubtedly mobile and

internet use can be considered as one of the significant parameter to evaluate digital literacy. Thus appraisal of digital literacy among dental students can reflect the standard of their knowledge related to the field as well as the need of implementation of technology in the present dental education system.

Very scanty literature is available on incorporation of digital technologies in dental educational systems. Usage of smartphone and technology has been investigated among medical students of Canada² and United Kingdom,³ both studies have expected the usage of smartphones to be beneficial for educational purposes and likely to increase in the future. A recent study among Kenyan⁴ medical students concluded that mobile learning is increasingly popular among medical students and should be leveraged in promoting access and quality of medical education. Little is known about perspicacity of dental students about their smartphones as a

* Corresponding author at: Department of Conservative dentistry, Government College of Dentistry, Sardar Patel Marg, Indore, Madhya Pradesh, India.

E-mail address: payal.endo@gmail.com (S.K. Gupta).

learning tool or device of specific applications. Principal findings of a study among Australians dental students⁵ has revealed that most students owned smartphones, were able users, and perceived them as learning tools that allow students to access to learning resources.

The aim of the present study was to assess the digital literacy of central Indian dental students including their perceptiveness about smartphone/internet usage for learning purposes. The objective was extended to evaluate students' attitude for implementation of digital technology in study programs/education system. To best of our knowledge, no such study has been conducted among Indian dental students.

2. Subject and method

2.1. Questionnaire

For this cross sectional study, a descriptive questionnaire was developed to assess digital literacy including students' perceptiveness about smartphone/internet usage for learning purposes as well as their outlook for implementation of digital technology in study programs/education system. not only students' subjective attitudes, but also to provide an objective understanding of the extent and complexity in which students have used smartphones. The validity of the questionnaire was tested within a group of undergraduate students. The questionnaire was divided in to four heads: (A) demographic details of students, (B) smartphone/internet usage, and (C) assessment of digital literacy, and (D) students' attitudes towards implementation of e technology in dental curriculum. The first component, part A, included demographic details and socioeconomic status of the students. Part B incorporated questions revealing internet use, its accessibility, type of device and database program used, commonest use of internet service including most often visited websites, and their social network. Commonest use of internet was assessed on basis of grading (1–7). Part C included digital literacy of students investigating their knowledge about keywords, educational apps and their management, searching/reading research journals and the limitations faced by them. Use of smartphone for educational purpose and its limitations were assessed using grading systems. For part D, students' attitude for implementation of digital technology in study programs/education system was evaluated by stating the degree of agreement/disagreement with four statements on a visual analogue scale (VAS). Rest three questions including distraction with mobile phones, their tendency to switch it off and students' perception of being connected to the teaching staff through smartphone were evaluated on simple agree/disagree stems.

2.2. Subjects and data collection

For the present cross sectional study, the questionnaire was distributed among total 260 (130 undergraduate from third and final year, 75 interns and 55 post graduate students) dental students from different dental institutes of Central India. The self-administered questionnaires were distributed among the students at their respective institutes in their lecture/seminar rooms before or after lectures after obtaining informed consent. All students present in the lecture/seminar rooms were given the opportunity to contribute. All the forms were filled completely and were returned back.

2.3. Data analysis

Data were analyzed with descriptive statistics. Chi-square tests were used to calculate the correlations between demographics,

assessment of smartphone usage and attitudes of different group of students. The analysis was done with SPSS version 21. Correlations were tested at 95% significance level ($p < 0.05$).

3. Results

3.1. Demographic details

Demographic characteristics of the dental students are given in Table 1. All 260 students returned the filled forms. Out of these 260 dental students, all were of Indian origin. There were 127 male and 133 female participants with mean age of 23.58 years. Amongst them, 130 were undergraduate (third and final year), 75 interns and 55 post graduate students. Approximately average gross annual income of parents was 6.26 lacs.

3.2. Assessment of smartphone/internet usage

Results regarding assessment of smartphone usage are summarized in Table 2. Out of 260 students, 250 (96.15%) were internet users. On intra-group comparison, use of internet increased chronologically with advancement of study stages as 94.62% of undergraduates, 96% of interns and 100% of the postgraduates answered positively although the difference was statistically insignificant ($p > 0.05$; Table 3) Out of total internet users, 56% (140/250) had internet access all time, rest 44% (110/250) used it at home/hostel. Most common device used for internet access was smartphone (88%, 222/250) followed by laptop, desktop and other devices. Strikingly, 94.23% (245/260) students owned a smartphone. Again smartphone ownership increased with study stages although insignificantly ($p > 0.05$; all post graduates, 96% interns and 90.77% of the students owned it). Most common operating system for smartphone was Android based (86.12%; 211/245) followed by I Phone (11.84%; 29/245) and Windows (2.04%; 5/245). Among the smart phone users, 18.37% (45/245) had unlimited internet package while 63.67% (156/245) had limited package, 16.73% (41/245) used internet with wifi only and rest 1.2% (3/245) did not use internet on their phone. The most common use of internet service was mailing and chatting with friends (42.8%; 107/250) followed by social networking (23.2%; 58/250). Most frequent utilization of internet service for professional studies was done by 20.8% (52/250) students while 8.0% (20/250) preferred its usage in general knowledge seeking. 5.2% (13/250) admitted that their commonest application of internet was banking and shopping (Table 2).

The commonest site for surfing related to knowledge seeking was google scholar (72%; 180/250) followed by Pubmed (11.6%; 29/250), Wikipedia (14/250; 5.6%) and Researchgate (13/250; 5.2%). Other common sites used for educational purpose were Ebscohost (2%; 5/250), wedMD (1.2%; 3/250), and youtube (1.2%; 3/250). 3 students did not mention any specific site stating it depends on the topic to be searched (Table 2).

In a question about accounts on social media website, all internet users (100%) were having their account on one or other

Table 1
Demographic details.

Sample size	Total = 260
Gender	Male = 127 Female = 133
Professional standing	Under graduate = 130 Interns = 75 Post graduate = 55
Age (in years)	Average 32.58 (20–35)
Average income (Indian rupee)	6.26 lacs

Table 2
Assesment of internet/smartphone usage.

Internet users 96.15% (250/260)		Device for internet usage		
		Smartphone (88%, 222/250)	Laptop, desktop and other devices (12%, 28/250)	
		Internet accessibility		
		Full time accessibility	Residential place only	
		56% (140/250)	44% (110/250)	
Smartphone owners		Operating system for smartphone		
94.23% (245/260)		Android based	I Phone	Windows
		(86.12%; 211/245)	(11.84%; 29/245)	(2.04%; 5/245).
		Internet package for smartphone		
		Unlimited internet package	Limited package	Wi-Fi only
		18.37% (45/245)	63.67% (156/245)	16.73% (41/245)
Preferred use of internet service				
Mailing and chatting with friends	Social networking	Professional studies	General knowledge seeking	Banking and shopping
42.8% (107/250)	23.2% (58/250)	20.8% (52/250)	8.0% (20/250)	5.2% (13/250)
Commonest site for surfing related to knowledge seeking				
Google scholar	Pubmed	Wikipedia	Researchgate	Others
72% (180/250)	10 (29/250)	5.6% (14/250)	5.2% (13/250)	<6%

Table 3
Intra-group comparison on basis of study stages assessing the students' attitude for implementation of digital/information technology in study programs.

Students (n)	Undergraduates (130)	Interns (75)	Postgraduates (55)	Total (260)	P value
Internet user % (n)	94.62 (123)	96 (72)	100 (55)	96.15 (250)	0.923 ^a
Smartphone user % (n)	90.77 (118)	96 (72)	100 (55)	94.23 (245)	0.798 ^a
Believes that social media helps % (n)	77.69 (101)	80 (60)	81.82 (45)	79.23(206)	0.946 ^a
Knowledge of keywords % (n)	61.79 (76)	83.34 (60)	92.73 (51)	74.8 (187)	0.02 ^b
Manage apps % (n)	77.12 (91)	95.83(69)	89.09(49)	85.31(209)	0.181 ^a
Having dental app % (n)	37.29 (44)	41.67 (30)	72.73(40)	46.53 (114)	0.000 ^c
Read research journal % (n)	34.15 (42)	44.45 (32)	96.36 (53)	50.80 (127)	0.000 ^c
Quick confirmation of query % (n)	100 (123)	84.72 (61)	96.36 (53)	94.8 (237)	0.474 ^a
Wants connectivity with teaching staff % (n)	86.92 (113)	95.83 (69)	100 (55)	91.15 (237)	0.628 ^a
Believes that smartphone distracts % (n)	92.37 (109)	91.67 (66)	81.82 (45)	89.79 (220)	0.891 ^a
Keeps smartphone switched off % (n)	29.66 (35)	37.5 (27)	45.45 (25)	35.51 (87)	0.093 ^a

^a Non-significant ($p > 0.05$).

^b Significant ($p < 0.05$).

^c Highly significant ($p < 0.01$).

social networking site. 79.23% (206/260) dental students believed that social media helps them in their professional course studies. Amongst them 77.69% were under graduates, 80% interns and 81.82% post graduates. This shows that this belief has uniform distribution in all the groups (Table 3). Most common social networking sites used were whatsapp (94.80%; 237/250) and facebook (87.20%; 218/250). Line (11.60%; 29/250), twitter (10.40%; 26/250), hike (7.60%; 19/250), instagram (5.60%; 14/250), pinterest (3.20%; 8/250) and tumblr (3.20%; 8/250) were other commonly used social network sites.

3.3. Assessment of digital literacy related to knowledge

74.8% (187/250) of internet user students had idea of keywords. Keywords were significantly more popular ($p < 0.05$) amongst the post graduates (92.73%) as compared to interns (83.34%) and under graduates (61.79) as shown in the inter group comparison in Table 3. Most preferable mode of searching was by typing the sentence (70.4%; 176/250). 85.31% (209/245) smartphone user students were able to manage their apps according to the requirements. Intragroup comparison showed that interns (95.83%) outperformed ($p > 0.05$) post graduates (89.09%) and under graduates (77.12%). But only 46.53% (114/245) students had some app related to the dentistry in their smartphone device. Dental apps were mostly used by post graduates (72.73%) followed by interns (41.67%) and under graduates (37.29%). This difference was highly significant ($p < 0.01$). Most usable app reported was related

to medical dictionary (57.96%; 142/245) followed by medical/dental forum (22.85%; 56/245) and drug index (19.18%; 47/245). Major limitations in downloading an app were that students found difficulty in selection of suitable app (41.63%; 102/245), apps being expensive (26.12%; 64/245), complexity in downloading it (20.41%; 50/245) and limited memory space in smartphone (11.83%; 29/245).

Nearly half of the students (50.8%; 127/250) used smartphone/internet to search and read research journals with the statistically highly significant ($p < 0.02$) percentage amongst post graduates (96.36%) as compared to interns (44.45%) and under graduates (34.15%). Most of the students (94.8%; 237/250) agreed that they use the internet for quick confirmation of their queries regarding studies. But here under graduates (100%) outperformed post graduates (96.36%) and interns (84.72%) although the difference was statistically insignificant ($p > 0.05$).

3.4. Assessment of students' attitude for implementation of digital/information technology in study programs

93.08% students were in favour of implementation of e-learning in their curriculum (242/260; 45% strongly agreed and 48.08% agreed). 5.77% (15/260) were not sure about it and only 1.15% (3/260) disagreed. 91.15% (237/260) of students wanted the use of smartphone by teaching staff to stay connected with students. Here, all the post graduates were in favor of it (100%) as compared to 95.83% of interns and 86.92% of under graduates. Although 89.8% (227/260) students agreed that using too much of smartphone

Fig. 1. Pie diagram showing attitude of dental students for implementation of e-learning in their curriculum (n=260).

distracts you while studying, only 35.51% (87/260) tend to keep their smartphones switched off while studying (Fig. 1).

4. Discussion

The results of this study among central Indian graduate and post graduate dental students shows their keen interest in inclusion of digital technology in dental curriculum. Opinion of teaching staff regarding acquiescence of smart phone and technology was not included in this study but it will also play an important role. This criterion can be included in future research. The students in the present study enthusiastically favored for the use of smartphone by teaching staff to remain connected with students.

Learning through web based education provides all the information regarding the subject irrespective of the regional distribution. Interconnection made by social media is best source for exchange and share of knowledge. As in this study, nearly 80% dental students found social media helpful in their professional course studies and there was a uniform distribution of this belief amongst the groups. This is in accordance to the previous studies which appreciated that blending of social media into traditional educational environments might enhance learning and collaboration despite geographic location.^{5,6}

Almost 94.23% (245/260) central Indian dental students owned a smartphone that is much higher than the reported less than 20% ownership in overall Indian population.⁷ That reflects eagerness of dental students for adoption of mobile learning technology which goes analogous to medical students of United States,⁸ United Kingdom⁹ and Kenya.⁴ It is quite evident from the results that all the post graduates were connected to the internet and had smartphones. The main possible reasons can be that they are financially independent, are more focused and professionally targeted.

Being more professionally and academically oriented, the knowledge of keywords was more amongst the post graduates; however; interns were more active in managing their apps. The possible reason can be that interns is a relatively heterogeneous

group with varied aims; have more spare time; are more experimental and are actively searching for future career prospects. Some are preparing seriously for the post graduate entrance examinations some are more concerned on refining their clinical skills as they are more inclined about starting their clinical practice; some are ready for switching their career options; and some are undecided yet. On the other hand post graduates are more mature; have clear and well targeted objectives and are more concerned towards professional aspects; hence; a higher percentage of them had apps related to dentistry and more aptly used the internet to search and read research journals.

The urge and inclination for knowledge was greater in under and post graduates as compared to interns as seen by their greater percentages in using internet for confirmation of any raised queries.

Conclusively, the results from this study support that students are employing smartphones and social media for their learning activities despite the fact that this technology has not been formally included in the curriculum. International technical organizations such as World Health Organization (WHO) and International Telecommunication Union (ITU) are encouraging adoption of eHealth and other Information and communication technologies (ICTs) in health facilities. In this scenario it might be advisable to propose some learning material that allows access through smartphones and amalgamate the technology in dental science for both teaching and learning.

Conflict of interest

The authors have none to declare.

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