

Investigating the Use of Smartphones for Learning Purposes by Iranian Dental Students

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Abstract

Introduction: The use of smartphones for teaching and learning purposes is increasingly being developed in the field of dentistry. This study aims to investigate the use of smartphones for learning purposes by Iranian dental students.

Materials and Methods: This is a descriptive study. The population of study consists of the general students of The Faculty of Dentistry of Ahvaz Jundishapur University of Medical Sciences (AJUMS) located in the south west of Iran. Sampling was practiced through census and by distributing questionnaires between all subjects. Totally, 109 cases (64 females and 45 males) filled the questionnaire. Data was analyzed using SPSS 21.

Results: Surfing course-related websites in the Internet and sharing notes with each other are the most frequent used items accounting for 96% and 94% of smartphone use, respectively. In addition, 91% of cases believe that smartphone improves their access to the content of courses. Moreover, 95% of cases have access to social media, especially Telegram, via their smartphone and acknowledge its usefulness in the education field. There was a positive correlation between the use of smartphones for general purposes and the use

of them for learning purposes (0.483). In addition, the correlation between age and the use of smartphones for general purposes and between age and the use of smart phones for learning purposes is negative (-0.279).

Conclusion: The use of smartphones for learning purposes or combining traditional educational approaches and e-teaching methods, including smartphones, can provide students with more diverse learning opportunities.

Key words: Dentistry, Learning, Smartphones, Students, Iran

Introduction

Dentistry is one of the most interesting academic majors in Iranian and many other countries' universities [1]. The use of smartphone is increasingly being developed for caring, teaching and learning purposes. However, the use of smartphones and their diverse capabilities depends on many factors such as availability of proper software and hardware and accessibility of high speed Internet [2]. Today, the application of smartphones in the teaching process, especially teaching medicine is well known and it is used as an effective learning device in any place and at any time [3]. The students of medical sciences and dentistry as well as their professors use many applications associated with their profession and field of study for clinical and learning purposes [4]. In addition, the use of education applications, including pharmacology and medical science resources, assists physicians to better perform their teaching and caring tasks and improves communications between medical staff and patients in hospitals by providing them with updated, rapid and practical information [5]. Ozdalga et al conducted a review study from 2011 to 2012 and reviewed 60 studies and stated the positive role of smartphones in the promotion of learning of the students of medical sciences [6]. Schulz et al studied the acceptance of e-learning devices by the dentistry students of Mainz University, the U.S.A. He concluded that a considerable portion of the students have welcomed the devices [7]. Gilavand et al conducted an interventional study on Iranian dentistry students and concluded that smartphone applications-aided teaching considerably promotes the learning and awareness of students compared with traditional approaches [8]. Jamal et al conducted a study on the Saudi Arabian students of different medical sciences and indicated the positive role of smartphones in clinical teaching and educational interactions between medical staff [9]. Albercht et al conducted a study in Germany and compared traditional approaches of teaching medical sciences (written courses) with smartphone-based teaching methods. They indicated the interest of students in smartphone-based teaching methods. Wu et al conducted a study in Canada and concluded that BlackBerrys smart phones have played a positive role in the interaction and exchange of information between physicians and nurses aimed at performing their professional tasks and improving patients' health status [11]. Smartphones and relevant applications installed on them are very advantageous and capable of promoting students' learning capability. On the other hand, dentistry students widely use smartphones for learning purposes. Considering the fact that smartphones alone or the combined use of traditional teaching approaches and e-teaching, including smartphones, can provide students with more diverse learning opportunities. This study investigated the use of smartphones for learning purposes by Iranian dental students.

Materials and Methods

This is a descriptive study conducted in the period 2016-2017 to evaluate AJUMS dentistry students' use of smart phones for learning purposes. The study tool is the research-made questionnaire of Wrang et al's study distributed between Australian dentistry students [12]. The validity and reliability of the questionnaire was confirmed in our study following customization and making slight changes in it. The first part of the questionnaire addresses demographic information and the second part has 16 items about dentistry students' use of smartphones. The second part includes four items about the role of social media in students' learning and the fourth part contains seven items about places where the studied students use their smartphone for learning purposes. Finally, the fifth part of the questionnaire has three items requiring the opinion of the studied students about the role of smartphone in their learning.

The population of study consists of all general students of the Dentistry Faculty of Ahvaz Jundishapur University of Medical Sciences (AJUMS) located in the south west of Iran. Currently, a total number of 264 students (157 females and 107 males) are studying in the general level in the Dentistry Faculty of the university. Sampling was practiced using census method and by distributing the questionnaire between all cases of which 109 cases (64 females and 45 males) filled it out. Data was analyzed by frequency, mean, percent, Mann-Whitney and Spearman's correlation coefficient in SPSS 21.

Results

Table 1 shows the demographic information of the cases. A total number of 109 students participated in this study, where 59% were female and 41% were male. In addition, 79% of cases were single and 21% were married. Regarding smartphone type, 77%, 18%, 3% and 2% of cases had Android, iPhone, Windows phone and BlackBerry smart phones.

Table 2 shows the items associated with the use of smartphone for learning purposes. According to the table, 79% of cases use their smartphone to search contents associated with their courses and 86% of them use it to search education-related bulletins. Moreover, 89% of cases use it to send emails to classmates and university staff, 78% of cases use it to study the text of classroom lectures, 82% use it to view the images of classroom lectures and 94% use it to view educational videos. Furthermore, 86% of cases use their smartphone to search Library resources and the content of texts, 96% of them use it and the Internet to search required educational texts, 94% use it to share their notes with classmates, 94% use it to take pictures of their work in university, 93% use it to make a video of their works in university, 92% use it for other educational purposes, not indicated in this study, and 86% of cases have dentistry or educational-related applications installed on their smartphones.

Table 1: The information of the participants

Variables	Number and percentage of individuals
Gender	***
Male	(45)-41%
Female	(64)-59%
Total	(109)-100.0
Marriage	***
Single	86(79%)
Married	23(21%)
Total	(109)-100.0
School year	***
1	1
2	33
3	30
4	21
5	7
6	13
No answer	3
Total	(109)
Age	***
Under 20 years old	17
21-25	85
26-30	5
31-35	5
36-40	1
41-45	1
Total	(109)
Smartphone Type	***
Android	84(77%)
iPhone	20(18%)
Windows phone	3(3%)
BlackBerry	2(2%)

Table 3 shows the role of social media in learning. Totally, 95% of cases have access to social media through their smartphone and know it is beneficial for learning purposes. According to the cases, Telegram, WhatsApp, Viber, Facebook, Instagram and other social media contribute to 50%, 26%, 7%, 5%, 2% and 11% of learning, respectively.

Which one of the following applications is frequently used by you for educational and learning purposes?

Telegram: 54(50%), WhatsApp: 28(26%), Viber: 8(7%), Facebook: 5(5%), Instagram: 2(2%), others: 12(11%)

Table 4 shows places where the cases use their smartphone more for educational purposes. According to the cases, home, different places of university, on transport (for

example in bus), library, amphitheater, working times in laboratory and other places contribute to 91%, 69%, 53%, 49%, 37%, 30% and 77% of places where the cases use their smartphone.

Table 5 shows the general opinion of the cases about smartphone and its impact on learning and education. According to the table, 91% of cases believe that smartphone improves their access to the content of their courses and educational content. In addition, 88% of cases believe that smartphone assists them in having a more independent learning process. Finally, 86% of cases think that university professors should pay more attention to the use of smartphone for educational purposes.

Table 2: Smartphone use questions

Item	Smartphone use questions	Yes	No	P
1	Do you search your course timetable?	86(79%)	23(11%)	P<0.01
2	Do you search education-related bulletins?	94(86%)	15(6%)	P<0.01
3	Do you send emails to your classmates and university staff?	89(82%)	20(8%)	P<0.01
4	Do you study the text of classroom lectures?	78(72%)	31(22%)	P<0.01
5	Do you view the images of classroom lectures?	82(75%)	27(25%)	P<0.01
6	Do you view educational videos?	103(94%)	6(6%)	P<0.01
7	Do you search desk resources and the contents of texts?	86(79%)	23(21%)	P<0.01
8	Do you search educational contents in web pages?	105(96%)	4(4%)	P<0.01
9	Do you share your notes with your classmates?	102(94%)	7(6%)	P<0.01
10	Do you take pictures of your work in university?	103(94%)	6(6%)	P<0.01
11	Do you make movies of your work in university?	101(93%)	8(7%)	P<0.01
12	Other uses?	100(92%)	9(8%)	P<0.01
13	Do you have any educational or dentistry-related application installed on your smartphone?	94(86%)	15(14%)	P<0.01

Table 3: Role of social media in learning

Item	Table 3: Role of social media in learning	Yes	No
1	Do you believe that social media is beneficial for education and learning purposes?	104 (95%)	5 (5%)
2	Do you have access to social media through your smartphone?	104 (95%)	5 (5%)

Table 4

Item	What are the places where you use your smartphone for educational purposes	Regularly	Generally	Rarely	Never	Agree (%)
1	Library	19	34	42	14	49%
2	Amphitheater	15	25	47	22	37%
3	Worktime in laboratory	13	20	46	30	30%
4	Different places of university	26	49	28	6	69%
5	On transport	18	40	30	21	53%
6	Home	54	44	10	1	91%
7	Other places	47	37	19	6	77%

Table 5:

	Cases' opinion	Completely agree	Agree	Completely disagree	Disagree	P	Agrees (%)
1	Smartphone has promoted my access to the contents of courses and educational contents	40	59	7	3	P<0.01	91%
2	My smartphone assists me in having a more independent learning process	30	67	3	9	P<0.01	89%
3	Professors should pay more attention to the use of smartphones for educational purposes	40	54	3	9	P<0.01	86%

Spearman's correlation coefficient shows that there is a positive correlation between the use of smartphone for general purposes and the use of it for learning purposes (0.483). In other words, as a student's use of smartphone for general purposes increases, his/her interest in using it for learning purposes significantly increases ($P < 0.01$). In addition, there is a negative correlation between age and the use of smartphone for general purposes and between the age and the use of smartphone for learning purposes (-0.279). This means that as age increases the interest of students in the use of smartphone for general and learning purposes significantly decreases ($P < 0.05$). Moreover, females and males as well as single and married cases were compared in terms of the use of smartphone for learning purposes using Mann-Whitney test and there was no significant difference between the groups.

Discussion

This study showed that dentistry students widely use smartphones for learning and educating courses. Surfing websites in the Internet associated with courses is the most frequent use of smartphones followed by sharing notes with classmates, dentistry-related applications installed on smartphones and making images and videos of university works. This agrees with Ozdalga et al [6], Schulz et al [7], Gilavand et al [8], Jamal et al [9], Albrecht et al [10] and Wu et al [11] studies. In addition, 95% of cases have access to social media through their smartphones and acknowledge the beneficial role of social media in education. According to the studied cases, Telegram and WhatsApp are the most frequent used applications for learning and educational purposes, respectively. This agrees with the results of Jamal et al [9], Malka et al [13], Goyder et al [14], Tran et al [15], Khanna et al [16], Johnston et al [17], Giordano et al [18], and Anyanwu et al [19]. However, some social media, including Facebook and Twitter, are censored in Iran and can be accessed only by proxy sites. According to the cases, home, different places of university, on transport (for example in bus), library, amphitheater, working time in laboratories and other places are the most frequent places, respectively where students use their smartphone for educational activity purposes. Finally, the majority of cases believe that their smartphones have improved their access to the content of courses and educational content. In addition, they believe that their smartphones help them in having a more independent learning process. The cases believe that professors should pay more attention to the use of smartphones. This agrees with Payne et al [20], Mosa et al [21], Baheti et al [22], Ozdalga et al [6], Schulz et al [7], Gilavand et al [8], Jamal et al [9], Albrecht et al [10], Wu et al [11] and Gavali et al [23] studies.

Conclusion

Even though this technology has not officially been included in curriculum, the use of it is rapidly being increased in educating in medical sciences due to its various advantages and capabilities in the learning process. It provides dentistry students with a proper opportunity for adopting different learning methods and may completely remove

the monopoly of traditional education methods, i.e. books and lectures, in the near future. However, the combined use of traditional approaches and e-learning methods, including smartphones, is currently more acceptable. Many students use the course-related applications installed on their smartphone throughout their career and occupational life even after graduating from universities. Low-speed Internet and censored social media in Iran, limited software educating the use of cell phones, the possibility of transferring diseases in clinical environments by cell phones and the possibility of the disclosure of personal information of users are the most important challenges of the use of smartphone for learning purposes. It is suggested that similar studies be conducted on other academic majors in order to more accurately conclude the impact of smartphones on the promotion of the learning capability of other students.

Acknowledgements

This article is extracted from a research granted by Ahvaz Jundishapur University of Medical Sciences, Iran (Department of Education Development Center, AJUMS). No: 33011363.

References

1. Gilavand A. The Comparison of Iranian and Foreign Students' Motivations to Choose Dentistry Field of Study. *Int J Pediatr*. 2016;4(6):1993-2010. doi: 10.22038/ijp.2016.6861
2. Liu Q, Peng W, Zhang F, Hu R, Li Y, Yan W. The Effectiveness of Blended Learning in Health Professions: Systematic Review and Meta-Analysis *J Med Internet Res* 2016;18(1):e2 URL: <http://www.jmir.org/2016/1/e2/> doi:10.2196/jmir.4807 PMID:26729058
3. Zhu E, Lilienthal A, Shluzas LA, Masiello I, Zary N. Design of Mobile Augmented Reality in Health Care Education: A Theory-Driven Framework *JMIR Medical Education* 2015;1(2):e10 URL: <http://mededu.jmir.org/2015/2/e10/> doi:10.2196/mededu.4443 PMID:27731839
4. Khatoun B, Hill KB, Walmsley AD. Dental students' uptake of mobile technologies. *Br Dent J*. 2014;216(12):669-73. doi: 10.1038/sj.bdj.2014.523.
5. Pimmer C, Mateescu M, Zahn C, Genewein U. Smartphones as Multimodal Communication Devices to Facilitate Clinical Knowledge Processes: Randomized Controlled Trial *J Med Internet Res* 2013;15(11):e263 URL: <http://www.jmir.org/2013/11/e263/> doi:10.2196/jmir.2758 PMID:24284080
6. Ozdalga E, Ozdalga A, Ahuja N. The Smartphone in Medicine: A Review of Current and Potential Use Among Physicians and Students *J Med Internet Res* 2012;14(5):e128 URL: <http://www.jmir.org/2012/5/e128/> doi:10.2196/jmir.1994 PMID:23017375
7. Schulz P, Sagheb K, Affeldt H, Klumpp H, Taylor K, Walter C, Al-Nawas B. Acceptance of E-Learning Devices by Dental Students *Med 2.0* 2013;2(2):e6 URL: <http://www.medicine20.com/2013/2/e6/> doi:10.2196/med20.2767 PMID:25075241
8. Gilavand A, Shooriabi M. Investigating the Impact of the Use of Mobile Educational Software in Increase of Learning

- Investigating the Impact of the Use of Mobile Educational Software in Increase of Learning of Dentistry Students. *Int J Med Res Health Sci.* 2016; 5(12): 191-197.
9. Jamal A, Temsah MH, Khan SA, Al-Eyadhy A, Koppel C, Chiang MF. Mobile Phone Use Among Medical Residents: A Cross-Sectional Multicenter Survey in Saudi Arabia *JMIR Mhealth Uhealth* 2016;4(2):e61 URL: <http://mhealth.jmir.org/2016/2/e61/> doi:10.2196/mhealth.4904 PMID:27197618
 10. Albrecht UV, Folta-Schoofs K, Behrends M, von Jan U. Effects of Mobile Augmented Reality Learning Compared to Textbook Learning on Medical Students: Randomized Controlled Pilot Study *J Med Internet Res* 2013;15(8): e182 URL: <http://www.jmir.org/2013/8/e182/> doi:10.2196/jmir.2497 PMID:23963306
 11. Wu R, Rossos P, Quan S, Reeves S, Lo V, Wong B, Cheung M, Morra D. An Evaluation of the Use of Smartphones to Communicate Between Clinicians: A Mixed-Methods Study *J Med Internet Res* 2011;13(3): e59 URL: <http://www.jmir.org/2011/3/e59/> doi:10.2196/jmir.1655 PMID:21875849
 12. Rung A, Warnke F, Mattheos N. Investigating the Use of Smartphones for Learning Purposes by Australian Dental Students. *JMIR mHealth uHealth.* 2014; 2(2): 1-8. doi: 10.2196/mhealth.3120.
 13. Malka ST, Kessler CS, Abraham J, Emmet TW, Wilbur L. Professional e-mail communication among health care providers: Proposing evidence-based guidelines. *Acad Med* 2015 Jan;90(1):25-29. [doi: 10.1097/ACM.0000000000000465] [Medline: 25162617]
 14. Goyder C, Atherton H, Car M, Heneghan CJ, Car J. Email for clinical communication between healthcare professionals. *Cochrane Database Syst Rev* 2015;2: CD007979. [doi: 10.1002/14651858.CD007979.pub3] [Medline: 25698124]
 15. Tran K, Morra D, Lo V, Quan S, Wu R. The use of smartphones on General Internal Medicine wards: A mixed methods study. *Appl Clin Inform* 2014;5(3):814-823 [FREE Full text] [doi: 10.4338/ACI-2014-02-RA-0011] [Medline: 25298819]
 16. Khanna V, Sambandam SN, Gul A, Mounasamy V. "WhatsApp"ening in orthopedic care: A concise report from a 300-bedded tertiary care teaching center. *Eur J Orthop Surg Traumatol* 2015 Jul;25(5):821-826. [doi: 10.1007/s00590-015-1600-y] [Medline: 25633127]
 17. Johnston MJ, King D, Arora S, Behar N, Athanasios T, Sevdalis N, et al. Smartphones let surgeons know WhatsApp: An analysis of communication in emergency surgical teams. *Am J Surg* 2015 Jan;209(1):45-51. [doi: 10.1016/j.amjsurg.2014.08.030] [Medline: 25454952]
 18. Giordano V, Koch HA, Mendes CH, Bergamin A, de Souza Felipe Serrão, do Amaral Ney Pecegueiro. WhatsApp Messenger is useful and reproducible in the assessment of tibial plateau fractures: Inter- and intra-observer agreement study. *Int J Med Inform* 2015 Feb;84(2):141-148. [doi: 10.1016/j.ijmedinf.2014.11.002] [Medline: 25468642]
 19. Anyanwu CO, Lipoff JB. Smartphones, photography, and security in dermatology. *J Am Acad Dermatol* 2015 Jan;72(1):193-195. [doi: 10.1016/j.jaad.2014.09.035] [Medline: 25497925]
 20. Payne KB, Wharrad H, Watts K. Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. *BMC Med Inform Decis Mak.* 2012;12:121. doi: 10.1186/1472-6947-12-121
 21. Mosa AS, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones. *BMC Med Inform Decis Mak.* 2012;12:67. doi: 10.1186/1472-6947-12-67.
 22. Baheti MJ, Toshniwal N. Orthodontic apps at fingertips. *Prog Orthod.* 2014;15(1):36. doi: 10.1186/s40510-014-0036-y.
 23. Gavali MY, Khismatrao DS, Gavali YV, Patil KB. Smartphone, the New Learning Aid amongst Medical Students. *J Clin Diagn Res.* 2017;11 (5):JC05-JC08. doi: 10.7860/JCDR/2017/20948.9826.