European Journal of Radiology Open 2 (2015) 129–133

Contents lists available at ScienceDirect

European Journal of Radiology Open

journal homepage: www.elsevier.com/locate/ejro

How Turkish radiology residents access information related to their profession in this social media and smartphone era

Can Ozutemiz*, Oguz Dicle, Nevin Koremezli

Department of Radiology, Dokuz Eylul University School of Medicine, Mithatpaşa cad. no. 1606 Inciraltı yerleşkesi, 35340, Balçova, Izmir, Turkey

ARTICLE INFO

Article history:
Received 2 July 2015
Received in revised form
27 September 2015
Accepted 26 October 2015

Keywords:
Radiology
Resident
Education
Smartphone
Social Media
Application

ABSTRACT

Purpose: To evaluate the frequency of mobile technology and social media usage among radiology residents and their access to professional information.
Materials and methods: A questionnaire consisting of 24 questions prepared using Google Drive was sent via e-mail to 550 radiology residents throughout the country. Of the 176 participating residents, 74 completed the survey via the internet, and 102 completed it at three different national radiology meetings. Response rates and its relationship with responses given to different questions were assessed.
Results: Hundred two male and 74 female residents participated in the survey. 141 (81.3%) residents thought that they had appropriate internet access in their department. The number of residents using a smartphone was 153 (86.9%). The android operating system (70, 45.8%) was the preferred operating system of respondants. Only 24 (15.7%) of the smartphone users thought that there were enough radiology related applications. "Radiology assistant" (18.9%), "Radiopedia" (7.8%) and "Radiographics" (7.8%) were the most utilized applications. Of the smartphone users, 87(56.9%) stated that they used cell phones in order to find radiological information, and the most used web pages were Google (165, 93.8%), Radiopaedia.org (129, 73.3%), Radiologyassistant.nl (135, 76.7%), and Pubmed (114, 64.8%). Social media usages were as follows: None (10, 5.7%), Facebook (139, 79%), Twitter (55, 31.3%), Google + (51, 29%) and YouTube (44, 25%).
Conclusion: While smartphone usage rates among the residents were high, the use of radiology specific applications was not common. Social media usage was very common among residents.

1. Introduction

Mobile technologies have evolved incredibly fast during the last 10 years and have become inescapable items of knowledge acquisition and communication. Since "Simon", the first item referred to as a smartphone, was introduced into the market in 1994, new models with faster processors and better imaging resolution come out each year [1]. The internet has been in every step of our daily lives since the mid 1990's. Beginning from mid-2000's, a new concept named as "social media" has also started to take part in our lives. With the introduction of Facebook in 2004 and Twitter in 2006, social media has become a phenomenon. Development of 3G, Wi-Fi networks and mobile technologies along with increased usage of the internet and social media has moved information from desktops into our pockets. It is now possible for people to access information and communicate with each other anywhere with just one finger motion.

According to the data from the Turkish Statistical Institute, Turkey, the third most densely populated country in Europe, has a population of 76,667,864, 25% of which are under the age of 15 [2]. With its growing number of youths, Turkey had 36,455,000 (36.5% of the population) internet users and 32,131,260 Facebook subscribers in June, 2012 [3].

We have started to observe these new changes brought into our daily radiology education. When the teacher asks a question during lecture, such as "what is dyspagia lusoria" or "what are the things that shine on T1 weighted images", it is becoming increasingly common to see residents searching for answers through their smartphones. It has become common for graduate radiologists living miles away from each other to discuss the images of patients in a radiology group on Facebook. We carried out this survey study to identify the frequency of mobile technology usage among the radiology residents in our country and how radiology residents

* Corresponding author at: Bayindir Devlet Hastanesi Radyoloji Bolumu, Mithatpasa mh. Hastane Cad. No:35, 35840 Bayindir, Izmir, Turkey. Fax: +90 232 259 0541.
E-mail addresses: canozutemiz@gmail.com (C. Ozutemiz), oguz.dicle@deu.edu.tr (O. Dicle), nevin.koremezli@deu.edu.tr (N. Koremezli).

http://dx.doi.org/10.1016/j.ejro.2015.10.001

access professional information through these new technologies and media.

Since English is the universal language in medicine, and most of the radiological information on the internet is published in English [4,5], we also wanted to assess general English skills of Turkish radiology residents. We also wanted to find out what printed or electronic training materials radiology residents had and how they utilized these materials. We thought that this would give us clues about how residents in Turkey study their lessons and search for a topic related to their study area. To our knowledge, there is no similar study performed in either radiology residents or other resident groups in our country or in Europe.

2. Materials and methods

The institutional review board approved this study protocol.

A survey consisting of 24 questions was prepared using Google Forms application (https://docs.google.com/forms). Before its online publication, the survey was administered to 10 non-radiology residents and 10 radiology residents to determine potential errors in the survey and online survey system. In September 2013, e-mails were sent to 550 radiology residents throughout the country using the e-mail database requested from the residency council of the Turkish Society of Radiology. Due to low response rate, the e-mails were re-sent. Seventy-four residents completed the survey on the internet by February 2014. The rest of the data were collected from 102 residents through face-to-face interviews at three different national radiology meetings (TURKRAD 6–10.11.2013, Radiology Winter Schools February 2014 and 9_{TH} annual meeting of Turkish Society of Interventional Radiology 21–23.3.2014). The respondents were informed they were not identifiable from the data.The online version of the survey can be accessed at http://goo.gl/eWzt0. An English version of the the survey can be achieved as a supplemantary material.

The data were obtained from the responses given by 176 residents. Response rates and the relationship between responses given to different questions were assessed. IBM SPSS version 21.0 software was used for statistical analyses. Descriptive statistics were calculated in each group. To determine the association of variables in independent groups (type of hospital, gender, residency year, foreign language knowledge, textbook ownership, smartphone usage frequency in order to achieve radiological information), $\chi 2$ analysis was used. A p-value of < 0.05 was used to indicate statistical significance.

3. Results

102 male and 74 female radiology residents joined the survey. Gender, age group and workplace differences are summarized in Table 1. The rates of those are in the 2nd-3rd year and the 4th-5th years of residency are 45.5% and 41.5% respectively. Responses show no significant difference between the groups in terms of gender, foreign language knowledge or textbook ownership.

3.1. Language skills

We asked several questions to the participants regarding their English reading, listening, writing and speaking skills. Only six (3.4%) participants stated that they did not know to speak English. Seventy-three (41.5%) claimed that they could understand a scientific article written in English completely. Fifty-seven (32.4%) claimed that they were able to speak to a foreigner on the phone. Fifty-six (31.8%) of the residents reported that they were able to write an article in English while 52 (29.5%) thought that it was impossible to write an article in English. The most difficult language skill was presenting in English, with only 39 (22.2%) answering that they could successfully do it.

Table 1
Frequencies of training centers, gender, age groups and smartphone ownership.

		$n = 176$ (%)
Training center	University hospital	113 (64.2)
	Government teaching hospital	63 (35.8)
Gender	Female	74 (42)
	Male	102 (58)
Age group	20–30	152 (86.4)
	31–35	20 (11.3)
	>35	4 (2.3)
Smartphone ownership	Android	69 (39)
	iOS Apple	61 (35)
	Windows	1 (1)
	Other	2 (1)
	None	43 (24)

3.2. Possession of printed educational material

We asked residents how many Turkish and English radiology textbooks they possessed and how many of them subscribed to a medical journal. Seventeen of them had no Turkish textbooks and 45 of them had no English textbooks. Sixty-five (36.9%) residents had three or fewer Turkish textbooks while 94 (53.4%) had four or more Turkish textbooks. 67 (38.1%) residents had three or fewer English textbooks while 64 (36.4%) had four or more English textbooks. Only 8 of the participants subscribed to a Turkish medical journal and 11 of them subscribed to a foreign medical journal in which Radiographics was the most popular with only 4 followers. We also asked the participants whether their radiology department had a satisfying textbook library. Only 53 (30.1%) responded with "yes" while the rest (123–69.9%) responded with "no". Of the 113 residents who worked in a university hospital, 75 (66.4%) thought they did not have a satisfying library at their institutions. This rate was higher (48–76.2%) in 63 residents who work in a government teaching hospital. However, the difference between the two groups was not significant ($p = 0.170$) (Table 2).

3.3. Smartphone ownership

According to the responses, 153 (86.9%) of the participants owned a smartphone during the survey. Of the 153 smartphone users, 80 (52.3%) had a phone with the "Android" operating system (OS) and 70 (45.8%) had an "iOS Apple" OS phone. Only one (0.7%) resident had a phone with the "Windows" OS and two had a phone with another OS (Table 1).

We asked radiology residents using smartphones if there were enough radiology related applications. Of the 153 users, 60 (39.2%) answered this question as "no", 69 (45.1%) answered as "few", while 24 (15.7%) answered as "quite enough". When asked to write down the two most used applications, they answered as "Radiologyassistant"(29–18.9%), "Radiopedia"(12–7.8%), "Radiographics"(12–7.8%), "Imaios" and "Radiological anatomy"(8–5,3%). 10 other applications were used less frequently and included: "Diagnostic and Interventional Radiology", "Eurorad" and "E-anatomy".

We asked the smartphone users how frequently they used their smartphone to search for information through the Internet when they had a question about a radiological issue. The results are shown in Fig. 1. A statistically significant difference was determined between the residents using smartphones "frequently" or "always" and the residents using smartphones "never", rarely" or "from time to time" when compared with e-book usage in their teaching insti-

Table 2
Availability of internet and other educational resources according to the type of training center.

		Residents from University hospitals (n =113)(%)	Residents from government teaching hospitals (n = 63)(%)	n = 176 (%)	p value
Internet access in the institute	+	96 (85)	47 (74.6)	143 (81.3)	0.090
	–	17 (15)	16 (25.4)	33 (18.7)	
Presence of a satisfying library in the institute	+	38 (33.6)	15 (23.8)	53 (30.1)	0.170
	–	75 (66.4)	48 (76.2)	123(69.9)	
Presence of an adequate number of e-books in the institute	+	53 (46.9)	16 (25.4)	69 (39.2)	0.005
	–	60 (53.1)	47 (74.6)	107(60.8)	

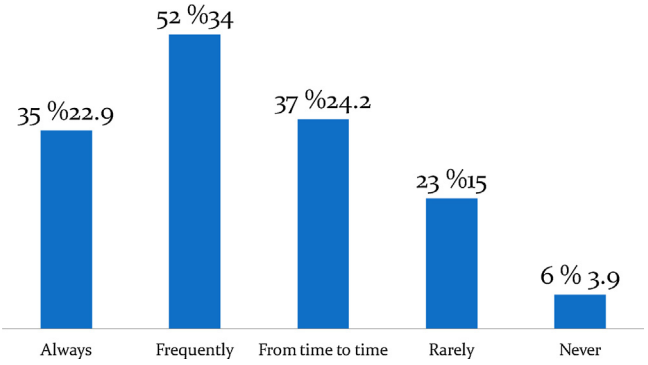

Fig. 1. How frequently residents with a smartphone used it to search for information on the internet when they had a radiology question.

tute. Those who had more e-books in their teaching hospital tended to use smartphones "frequently" or "always ($p = 0.006$).

3.4. Electronic resources and social media

We asked the participants which electronic devices they owned. 141(80.1%) of them had a laptop, 67 (38.1%) of them had a tablet and 35 (19.9%) had a desktop at home. Nine of the participants possessed all four items at home. Only one participant did not have any of these or a smartphone. 30 of them had a smartphone, a tablet and a laptop. The internet access rate and the rate of electronic book library presence in radiology departments are listed in Table 2. There was no significant difference ($p = 0.092$) in rates of internet access between different types of hospitals. Although, many responders had internet access, presence of an e-book library was significantly different between different types of hospitals ($p < 0.05$)

We asked the participants to state the two most common ways they use in order to obtain radiological information during night duty or reporting in hospital excluding consulting with their senior. The options were: (a) a printed textbook (b) an e-book on the desktop (c) the internet via the smartphone (d) the internet via the tablet (e) the internet via the desktop. Using the internet via the desktop was the most frequently used method [n = 146 (83%)], and using a printed textbook was the second most frequently used method [n = 58 (33%)].

We asked the participants to indicate which web pages they used when they needed information on radiology. We included the most popular search engines such as Google, Yahoo, Yandex, Bing, Wikipedia and medical databases such as Pubmed, E-medicine and Sciencedirect. We decided to put additional radiology web pages such as Radiopaedia.org, Radiologyassistant.nl, AuntMinnie, GoldMiner and others. The most commonly used web pages were Google (165–93.8%), radiologyassistant.nl (135–76.7%), Radiopaedia.org (129–73.3%) and Pubmed (114–64.8%), followed by Wikipedia (32–18.2%), E-medicine (20–11.4%) and Sciencedirect (17–9.7%) (Fig. 2). According to the survey results, radiological sources such as AuntMinnie (15–8.5%) and GoldMiner (2–1.1%) were not preferred by Turkish radiology residents. Likewise, the search engines Yahoo and Bing were not widely favored. Significantly, the first year residents preferred to use Wikipedia (34.8%–18.2%, $p = 0.014$) and Radiologyassistant.nl less (43.5%–76.7%, $p < 0.05$) compared to their seniors.

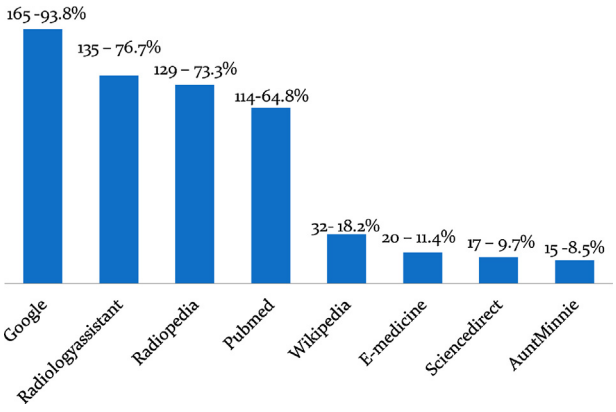

Fig. 2. Main web pages preferred by residents.

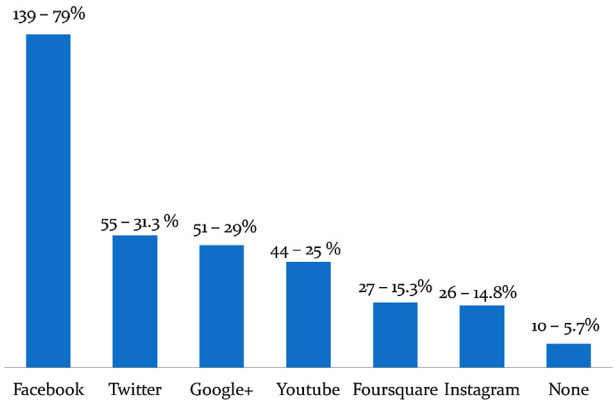

Fig. 3. Social media usage among residents.

Finally, we asked the participating residents if they had any social media accounts. Of the 176 residents, 10 (5.7%) did not have any social media accounts. Results are shown in Fig. 3.

4. Discussion

Turkey is a developing country on the verge of becoming a member of the European Union. Radiology residency is one of the most popular and competitive medical specialty in Turkey. Although the exact number is not known due to new graduates and new beginners during the study period, it is estimated that there are approximately 600 radiology residents throughout the country. Based on the results of our study group, more than 50% of the Turkish radiology residents are male, approximately 85% of the residents are younger than the age of thirty and 64.2% of them are working in a university hospital. The education period was five years until three

years ago, but it was reduced to four years even though this decision was objected by the Turkish Society of Radiology (TSR). Over the last ten years many new medical faculties and teaching hospitals have been established for popular and political reasons without basic requirements, imaging modalities or man-power. There are still many experienced institutes containing all aspects of radiology education which conform with the European Radiology Curriculum [6], but also there are institutes with only a few residents and academicians. Heavy workflow is another problem keeping residents from education and research, especially in government teaching hospitals where "training is mostly conducted by working as an apprentice". These differences create huge gaps between radiology residents. Self-learning, e-learning and evidence based medicine (EBM) are all essential to overcoming this problem [7]. English is the universal language in medicine, and most of the radiological information on the internet and scientific journals are published in English [5].

Although, we did not measure the English language skills of the participants with a standard method, we simply asked the residents their opinion of their English skills such as reading, understanding, listening, speaking and writing. Most (96.6%) of the residents were familiar with the English language though not to the same extent. However, only 41% found themselves to be able to fully understand articles written in English. Skills such as listening and speaking English were even worse (less than 35%). However, despite their poor English, Turkish residents still preferred to seek medical information through the internet by looking at pictures or trying to understand English texts due to the absence of Turkish online radiological resources.

The results of our study revealed that many of the Turkish residents still had printed textbooks. More than half of the residents had textbooks written in Turkish, not English, due to several reasons. Although lately many English books have been translated into Turkish, English books are still more expensive and reading a book in a foreign language takes much more time. Our results show that almost 70% of the residents thought that they did not have a satisfying library in their workplaces. This rate was 66% in universities and 76% in public teaching hospitals. This difference is not statistically significant. While e-books are gaining in importance, 60% of respondents thought that there were not enough e-books in their institute computers. Significantly, in government teaching hospitals this rate was higher (74%) compared to that at universities (63%). These numbers are rather surprising because many institutes which were supposed to provide education did not have enough material to do so.

According to our study, the residents were very reluctant to be a permanent subscriber to a medical journal. There were only eight subscribers to a Turkish medical journal and 11 to a foreign medical journal. "Radiographics" was the most commonly subscribed journal. This may be due to easy-to-reach high-speed internet access to any favored magazine freely in the workplace, an issue to be discussed in this study later.

In medical student education, there are prospective observational studies indicating that computer-aided learning is correlated with better results in class ranking and problem-solving skills compared to classical teaching methods [8,9]. Radiology is almost always performed on digital platforms, therefore, teaching in radiology needs to adapt and embrace rapid technological advances [10]. In our study, smartphone usage rate was very high among the residents (86.9%) and similar to other survey studies [11]. Unlike American radiology residents who prefer Apple's Iphone and Ipad [12], Turkish residents prefer android based phones. It is surprising that Windows phones are almost never preferred by residents used to using Windows on their desktops, probably due to a lack of appropriate applications. In year 2012, Székely et. al identified 102 radiology related applications for mobile devices [13]. In our study, only 24 (15.7%) of the 153 smartphone users thought that there were enough smartphone applications specifically related to radiology, while 39.2% of them thought the opposite. "Radiologyassistant"(29–18.9%), "Radiopaedia" (12–7.8%), "Radiographics" (12–7.8%), "Imaios" and "Radiological anatomy"(8–5,3%) are the most utilized applications. It is also surprising that there is no native language radiology application. Despite the fact that there are not many accepted applications, of the 153 smartphone users, 35 (22.9%) used their smartphones to seek radiological information through the internet "always", 52 (34%) "frequently" or 37 (24.2%) "from time to time". There might be several reasons of why radiology specific applications are not widely accepted among residents. Lack of native language support, insufficient user friendly software designs, being unaware of such applications, resolution problems, processor speed limits, lack of scientifically trustworthy software or simply being unaccustomed to using these new applications, all might have a role. With the developments in these mobile technologies, we believe the number of residents using smartphones and the number of radiology specific applications will be increasing even as you read this article.

Tablets are also becoming the most essential utilities for residents. Many universities and departments give free tablets and educational footage to their students in several countries [12]. Applications for radiology, online curriculums and remote meeting tools are constantly being developed [14]. Although tablets are more frequently used across the Atlantic, only 38.1% of Turkish radiology residents had one. Eighty percent had a laptop at home which was used for general purposes. The rate of having or using desktops at home has dropped to 20% since the introduction of mobile technologies.

The availability of internet access at work was very high, and 143 (81.3%) of the residents stated that they could easily access the Internet in their radiology department. A recent survey study from India conducted with 80 radiology residents has similar results: 80% of the residents can access the Internet while only 45% can access Medline [15]. Though we did not investigate the Medline access, we think that we would have obtained similar results if we had done.

The most widespread method excluding asking a senior consultant to obtain professional information during the night duty or reporting when they need additional knowledge was using the Internet via desktop [$n = 146$ (83%)]. Using a printed textbook was the second most common method [$n = 58$ (33%)]. Using a smartphone was the third most preferred method [$n = 47$ (26.7%)] and e-book usage was the least common method [$n = 34$ (20%)] despite 40% of the participants stating that there were adequate e-books in their workplace.

E-book usage is getting more common in western countries. In July 2010, Amazon.com reported e-book sales outnumbered sales of hardcover books [14]. In Turkey, due to several reasons (technical, legal and economic), e-book sales are relatively low [16]. People tend to use pirated e-books because they are free and companies are reluctant to sell e-books due to low profit expectancy. Even though people are using pirated e-books, usage is less compared to printed textbooks. The first major reason is that people are accustomed to reading printed papers. Secondly, people do not have the necessary piece of technology (kindle, ipad etc.,) to read it. To our knowledge, there are no radiology e-books in Turkish to purchase on the Internet. We expect that e-book usage will be more common in the next decade [16].

It is known that web-based tools have some advantages over in-person/printed educational tools. They can overcome physical or temporal barriers, provide searchable content and encourage interactivity [17]. The most commonly used web page is Google. More than 90% of Turkish radiology residents asked Google to obtain radiological information. Google was followed by Radiopedia.org, Radiologyassistant.nl and Pubmed in the given order.

Although social media has been an integral part of our daily life since 2000, its utility is still being questioned throughout the world. One of the most controversial issues is the appropriate and professional use of social media. Many medical branch societies have started to declare guidelines [18–21]. Many academicians also check their residents' social media accounts for resident applications [22]. Of the 176 residents in our study, 10 (5.7%) did not have any social media account. Facebook (139–79%), Twitter (55–31.3%), Google + (51–29%) and Youtube (44–25%) were the most frequently used social media tools (Fig. 2). The growing rate of social media tools can be beneficial for radiology residents in several ways. These can help the residents to communicate and to organize more easily. They can share educational materials and create discussion groups [23]. Many online education portals have already started to share "case of the day" in their social media accounts such as Radiopaedia.org or AuntMinnie. It should be kept in mind that the residents can access news on radiology-related innovations and technologies more easily in the institutions where they work no matter how insufficient the opportunities these institutions have.

Although social media is attractive and promising, it holds potential ethical problems for residents such as usage of unprofessional content, patient information disclosure, loss of doctor-patient confidentiality etc. [18,23]. Although we did not question these factors, we thought there was little interest in, and awareness of, the subject both among students and academicians in our country, and we believe that this can be an interesting topic to research.

Our study has some limitations. First, the results represent the data for only about 30% of Turkish radiology residents. Secondly, the response rate on on-line questionnaire is very low. This seems to go against the hypothesis that internet-based communication dominates face to face interactions. However, our response rate is much higher compared to similar studies conducted among other medical specialty residencies. As for such questionnaire, low response rates are very common for the physicians [22,24].

5. Conclusions

Radiology is a very visual, communication based and dynamic practice. It has had a pioneering role in the information technologies for many years. Therefore, it is not surprising that radiology takes the lead among the training and interaction models in terms of social media and mobile technology use. As one of the few studies conducted in this area, our study shows the high acceptance of social media and mobile application use in radiology training and practice. Since the survey population and response rate is very high compared to other studies, we believe that our results will provide a cross-sectional data for radiology education curriculum developers, technology producers working in this field and those who are interested in the utilization rates of social media in radiology. Ongoing and periodic surveys will be necessary to monitor tendencies and benefits.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgments

We would like to thank Assoc. Prof. Dr. Aslı Suner for her help with statistical analysis and Mr. Mustafa Demir for his editing in English

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ejro.2015.10.001.

References

[1] M. Sarwar, T.R. Soomro, Impact of smartphone's on society, Eur. J. Sci. Res. 98 (2) (2013) 216–226.
[2] Turkish Population. http://www.turkstat.gov.tr/UstMenu.do?metod=temelist (accessed 08.11.2014).
[3] Internet Usage in Europe. Internet User Statistics & Population for 53 European countries and regions. http://www.internetworldstats.com/stats4.htm (accessed 08.11.2014).
[4] INTERNET WORLD USERS BY LANGUAGE. http://www.internetworldstats.com/stats7.htm (accessed 16.04.2014).
[5] C. Cameron, S. Chang, W. Pagel, Scientific English a program for addressing linguistic barriers of international research trainees in the United States, J. Cancer Educ. 26 (1) (2011) 72–78.
[6] Revised European training curriculum for radiology. 2014. Vienna, Austuria: Riedeldruck.at;.
[7] A. Carriero, L. Bonomo, F. Calliada, P. Campioni, C. Colosimo, A. Cotroneo, et al., E-learning in radiology: an Italian multicentre experience, Eur. J. Radiol. 81 (12) (2012) 3936–3941.
[8] M. Maleck, M.R. Fischer, B. Kammer, C. Zeiler, E. Mangel, F. Schenk, et al., Do computers teach better? A media comparison study for case-based teaching in radiology, Radiographics 21 (4) (2001) 1025–1032.
[9] D.G. Healy, F.J. Fleming, D. Gilhooley, P. Felle, A.E. Wood, T. Gorey, et al., Electronic learning can facilitate student performance in undergraduate surgical education: a prospective observational study, BMC Med. Educ. 5 (2005) 23.
[10] A.F. Scarsbrook, R.N. Graham, R.W. Perriss, Radiology education: a glimpse into the future, Clin. Radiol. 61 (8) (2006) 640–648.
[11] Epocrates Epocrates Mobile Trends Report 2013. 2013.
[12] P. Bhargava, A.E. Lackey, S. Dhand, M. Moshiri, K. Jambhekar, T. Pandey, Radiology education 2.0–on the cusp of change: part 1. Tablet computers, online curriculums, remote meeting tools and audience response systems, Acad. Radiol. 20 (3) (2013) 364–372.
[13] A. Szekely, R. Talanow, P. Bagyi, Smartphones, tablets and mobile applications for radiology, Eur. J. Radiol. 82 (5) (2013) 829–836.
[14] P. Bhargava, S. Dhand, A.E. Lackey, T. Pandey, M. Moshiri, K. Jambhekar, Radiology education 2.0–on the cusp of change: part 2. eBooks; file sharing and synchronization tools; websites/teaching files; reference management tools and note taking applications, Acad. Radiol. 20 (3) (2013) 373–381.
[15] C. Anuradha, K.S. Jacob, N.K. Shyamkumar, G. Sridhar, Evidence-based practice in radiology: knowledge, attitude and perceived barriers to practice among residents in radiology, Eur. J. Radiol. 82 (5) (2013) 894–897.
[16] Does E-book work in Turkey? http://www.ntvmsnbc.com/id/25116494/ (accessed 27.04.2014 21.07.2010).
[17] L.F. Chu, B.K. Chan, Evolution of web site design: implications for medical education on the Internet, Comput. Biol. Med. 28 (5) (1998) 459–472.
[18] F. Gholami-Kordkheili, V. Wild, D. Strech, The impact of social media on medical professionalism: a systematic qualitative review of challenges and opportunities, J. Med. Internet Res. 15 (8) (2013) e184.
[19] M.T. Pillow, L. Hopson, M. Bond, D. Cabrera, L. Patterson, D. Pearson, et al., Social media guidelines and best practices: recommendations from the council of residency directors social media task force, West J. Emerg. Med. 15 (1) (2014) 26–30.
[20] P.D. Patel, J.L. Roberts, K.H. Miller, C. Ziegler, M. Ostapchuk, The responsible use of online social networking: who should mentor medical students, Teach Learn Med. 24 (4) (2012) 348–354.
[21] T. Kind, P.D. Patel, D. Lie, K.C. Chretien, Twelve tips for using social media as a medical educator, Med. Teach 36 (4) (2014) 284–290.
[22] A.L. Barker, H. Wehbe-Janek, N.S. Bhandari, T.M. Bittenbinder, C. Jo, R.K. McAllister, A national cross-sectional survey of social networking practices of U. S. anesthesiology residency program directors, J. Clin. Anesthesia 24 (8) (2012) 618–624.
[23] P.M. Prasanna, F.J. Seagull, P. Nagy, Online social networking: a primer for radiology, J. Digit Imaging 24 (5) (2011) 908–912.
[24] P.B. Mason, B.M. Turgeon, J.S. Cossman, D.M. Lay, The use of technology and perceptions of its effectiveness in training physicians, Med. Teach 36 (4) (2014) 333–339.