ANALYSIS OF MOBILE DEVICES AS A SUPPORT TOOL FOR PROFESSIONAL MEDICAL EDUCATION IN THE UNIVERSITY SCHOOL

L. Briz Ponce[1], J.A. Juanes Méndez[2], F.J. García Peñalvo[3]

[1] Research Institute for Educational Sciences. University of Salamanca (SPAIN)
[2] University of Salamanca. Head of visualMed System Group. Subdirector of the Research Institute for Educational Sciences (SPAIN)
[3] Research Group in InterAction and eLearning (GRIAL). Research Institute for Educational Sciences. University of Salamanca (SPAIN)

Abstract

According to the report of International Telecommunications Union (ITU), there are approximately 6.800 millions of users in the world with a mobile device. The fast evolution of these mobile devices for the last two decades has made the mobile phone become a minicomputer with a data connection. Because of the use of these mobile phones, the mobile applications appeared just one year later that the launching of the first iPhone and now the number of these applications reach more than 1 million in play store or app store (two application market for two different operation systems).

All these data illustrates the considerable importance of the mobile devices in our society and the tremendous opportunity for the medical education. The physicians and the medical students are using more and more these mobile devices daily in their work or even in their self-learning. Currently, some university schools of medicine in EEUU have already introduced the tablets as a new tool for education. The aim of this study is to make an analysis of the current usage of mobile devices and mobile applications in the University medical school and the main advantages and disadvantages of introducing this tool as part of the education curriculum.

Keywords: Medical Education, mobile devices, mobile application, higher education, mobile learning.

1 INTRODUCTION

Because of the rapid growth of mobile devices and the mobile applications, more and more areas are including the mobile devices to enhance the content of the information of their sectors. According to the report of PriceWaterHouse, the ubiquity of the mobile devices allows a tremendous opportunity for the medical sector. In fact, this company together with the Global Systems for Mobile Communications Association (GSMA), expects that the mhealth market in the world reach 23000 millions $ by 2017 [1].

The medical professionals are starting to adapt to the new technologies. In fact, the preference for using mobile devices in health professionals is very high, 60% of them use the mobile phone daily and 44% use tablets [2]. In addition, a survey conducted by the General Medical Council demonstrated that 30% of doctors use a smartphone for medical apps [3].

In Spain, according to the report published by Telefónica in January of 2014 [4], 90% of physicians accessed to internet during 2013 at least with two types of devices. Besides, 51% of them have used the smartphone for accessing medical information.

These data highlight the importance and the relevance that the new technologies are becoming for the physicians.

This article is structured in this way: first of all, we explain the importance of these new technologies in the academic medical environment, after that, we show some medical schools that have adopted the mobile devices as a new tool in order to allow the students to achieve their maximum potential. Third, we explain the advantages and disadvantages of adopting these new technologies in the curriculum and finally, we include a conclusion.

2   MEDICAL SHOOLS

There have been some medical schools that have included the new technologies in its educational curriculum as a new tool to be used by students and professionals.

Some medical schools have adopted a program in order to introduce the iPAd among students curriculum. This is the case of Yale School of Medicine for example. They have provided an iPad for all students since 2011 [5]. However, since last year, they have given a stipend to purchase an ipad mini. This initiative is extremely popular among third-year students [6].

The trend was taking off in medical schools all over the US, including at Brown or Georgetown University School of Medicine. Both of them require the students to purchase an iPad. The first School implanted this initiative in 2011 and the second School in 2009 [7]. Georgetown University allows Android devices as well. Irvine, University of California has provided an iPad to all incoming students since 2009 [6]. Stanford School of Medicine has given an iPad since 2010 to 2012 to the students but since 2013, it has given a stipend in order to purchase a mobile device of their choice [8]. Ohio State University College of Medicine (OSU) has provided an iPad for incoming students since 2009 [6]. The University of Minnesota Medical School decided to provide the first-year student an ipad in 2011 following the iPad project [9]. University of Central Florida College of Medicine has given an iPad since 2010 [7] or Geisel School of Medicine at Dartmouth started a pilot in summer 2012 to provide an iPAd as well to incoming students, as it´s published in its web page [10].

This initiative has arrived in Europe. In UK, Manchester Medical School announced in 2011 to introduce this program but for students in year 4 (or 5 out). University of Leeds had a similar scheme, offering an iPhone 4 to the students of the final year [11].

Harvard Medical School and Texas Tech University Health Science Center have chosen other programme, as they don´t provide a tablet device. Instead, they have decided to provide tools for students. For example, the course lectures are translated into audio and video files that students can download into Mobile devices in their media players. Besides, recordings of lectures can be given to students who are unable to attend the lecture in the classroom [6].

The main reasons to adopt this initiative are: cost savings and improvement to the learning process itself [12].

Stanford University cited four reasons to adapt the new program of mobile devices [13]: "*student readiness, noting that iPad "creates opportunities for efficient, mobile, and innovative learning*"

Besides, Stanford wanted to save the amount of printed materials that they use, so they decided to move a mobile digital education.

Another notable example is Geisel School of Medicine at Dartmouth. Leslie H. Fall, M.D., associate dean for faculty development at this school announced: "*For our faculty, it's making them think more about active learning, how to share with each other, and how to make effective use of technology.*" [6]

The teachers are also very involved to promote this initiative. With these new tools, the teachers are able to change the course materials as often as necessary and the graphics are much clearer too [12]. In Yale School of Medicine, for example, one of the teachers uses a new program to send images to his students' devices. They must identify a clinical problem by circling it on the screen and they can post comments to be discussed in classroom. Another similar app is used by an associate professor in Geisel School of Medicine in order to share images with the students and see their work [6].

This program has been a success, as they have kept it since they started it. Students, faculty and other stakeholders were hesitant at the beginning to adopt paperless technology. According to Dr. Charles Prober, Stanford´s Senior associate dean for medical education said that when Stanford started its mobile device program, about 30% of students requested printed coursework materials. However, this number has gone down significantly [6]

More and more universities are adopting the mobile device program in order to make students be the new physicians in this digital area. All of them agree that the students have to be prepared for the future and the best way to do it is to start from the medical school.

3 ADVANTAGES AND DISADVANTAGES

The adoption of new technologies in the education has a number of attractive features. However, there are certain drawbacks associated with the use of these technologies that it is necessary to take into account as well.

3.1 Advantages

The benefits for using new technologies in the medical environment are reported in different researches. All of them confirm the advantages and the potential benefits to enhance the learning for all medical professionals or future professional. In accordance with the advantages, the study published by Wallace, Clark & White [14] performed a survey to students, residents and faculty in order to examine their attitudes about the current and future use of mobile computing devices in medical education. They listed the advantages of using mobile computing devices in medical education:

- Portability. The respondents explained that with the iPad they just can carry the size of a small textbook and have access to multiple textbooks.

- Fast access to information on the internet. The participants said that they can access to resources for learning "on the go" what had a positive educational effect for them

- Efficient use of time. Some participants described using the devices to make use of 'downtime' to learn more efficiently

- flexible communications, Respondents described the immediacy and convenience of accessing information right at the time when it was needed

- Powerful applications and access to multimedia resources. To confirm this result, 91.3% participants, in the performed survey of Boruff, & Storie [14], said they were successful in finding the information they needed.

Boruff et al [15] confirmed as well the benefits of the use of mobile devices. They reported that the convenience, accessibility, and overall utility of mobile devices are a result of their compact size and portability.

Besides, according to the results of the survey performed at Baylor College of Medicine in Houston and at Texas A&M Health Science Center College of Medicine [16], 91% of students owned a smartphone or similar device what reflects the accessibility of the mobile devices for the students. In addition, they explained as well, that the healthcare professionals viewed mobile device as a way to increase job efficiency and assist in improving the quality of healthcare delivery.

The advantages reported by Chu, Erlendson, Sun, Alva & Clemenson [17] in their article are also accord with the ones listed earlier.

1) Bring just-in time learning, Increase confidence in learning and physician attitudes

2) Increases learning opportunities and time studying. A survey reported that they spent more time studying outside of the hospital due to the tablets and the ease access of digital resources.

3) Increase efficiency within the hospital.

The study published by Vafa et al [16] explained that the majority of students perceived the use of mobile technology in medical education as a feasible application. The comments of the participants highlighted three themes:

1) The current use of mobile technology in the clinics and other institutions. One of the participants of the survey said: "It´s absolutely feasible. In fact, I would go so far as to say that the integration of mobile technology to not only medical education, but medical practice is inevitable"

2) Common technology ownership and comfort of use. Other participant commented: "The future is driven by computing and only by using the technologies as they come out we will be prepared for that future".

3) Efficiency and accessibility to learning materials. One of the participants concluded: "I think investing in a mobile device that can download educational tools can be very helpful in the learning process".

3.2 Disadvantages

As for the barriers to adopt the mobile devices in medical education there have been some researches that confirm the importance of taking into account the limitations. Some of them are included in this article.

Boruff et al [15] published a research that reflects how the Canadian medical faculties use the mobile devices to answer clinical questions and find information. They showed the barriers to access:

- Wireless access in the hospital or clinic. This barrier was reported as the main barrier with 70,7% of participants recognizing it as being a problem.

- Knowing what resources are available. It has 55,8% of participants considering it as a common barrier.

- Lack of time, considering it as a barrier by 26,3% of participants.

- Understanding how to use the technologies with 20,8% of respondents reporting it as a barrier.

- Technology problems. It was considered as a barrier by 20,7% of respondents.

- Complicated installation process with 18,3% of responds reporting it as a barrier.

These barriers corroborates the results of the following survey performed by Wallace et al [14], who explained in their article that the use of new technologies has a lot of benefits, but also potential problems associated to it:

- Superficial learning. Some participants commented that the mobile devices might inhibit the knowledge as the learners can access information rapidly.

- Not understanding how to find good learning resources. The learners expressed concerns about how they can find "good applications", and how they would know if the information provided was of high quality.

- Distraction. The mobile devices could cause distraction from normal activities of learners in classroom.

- Inappropriate use and concerns about access privacy. Some participants said: "I think there is a problem having personal stuff and professional stuff on the same device"

- Blurring of personal/professional boundaries. Respondents expressed concerns about mobile devices allowing potential intrusion of personal matters into professional and clinical duties.

The article reported by Chu et al [17] and the recent study presented earlier by Vafa et al [16], apart from the advantages described above, took into account the challenges to introduce the new technologies. The first article [17] considered the following barriers:

- Just-In time learning decreases with repetition and relative experience.

- Barriers and technical challenges of deploying mobile devices. For example: small screen, low resolution, limited processor capabilities etc.

- Maintaining professionalism and privacy standards when deploying mobile computing devices. This article explained that 47 out of 78 reported incidents of students posting unprofessional online content.

- Volume licensing policies for mobile device management. This barrier is related with the difficult to purchase large volumes of mobile device applications.

The second article [16] highlighted more the technical problems to adopt the mobile technologies in a medical education environment: 1) larger displays (according to 60% of participants), 2) Better deployment of technology and faster data transmission (reported by 60% of respondents). 3) Connectivity 4) Price of application and 5) Internet speed. Besides, students indicated that the implementation of mobile technology may not be cost effective and there is a lack of confidence with the schools´ instructional technology infrastructure and difficulty in addressing the needs of everyone.

4 DISCUSSION

As for the new technologies, in concrete, for the use of mobile devices in medical education, we can see the faculty and university are encouraging the use of these new devices. Overall, this initiative is adopted in USA and more and more schools are starting to adopt it. The institutions see benefits for their internal economy as with the use of tablets by the students, they can cut down the costs used for

paper coursework. For the students, they see that the new era is demanding more and more medical professionals able to adapt and use the new resources available for them, so the best way that the new professions start to get used to the new technologies is in the university. Different researches and surveys performed in different schools agree in the advantages of using mobile devices. All of them consider it necessary in order to evolve the education and make the students more trained for the future. However, all of them agree that there´s a number of disadvantages to take into account as well. Some of them related with technological problems, although the use of wifi connections or even the evolution of the networks as 4G network are attempting to address the connectivity and internet speed problems. The problems related with privacy standards and confidentiality of patients' data should be avoided with a regulation by a certificated regulator. The cost for the students is an issue as well, although the students need to purchase books extremely expensive that can be reduced with the use of mobile devices.

5 CONCLUSIONS

The adoption of new technologies in medical schools is a reality. The evidence shows that mobile devices have an ever-growing presence in medical education and the different results of the researches seem to suggest that teachers and students want to be prepared for the developing digital area. Although it is necessary to deal with different barriers, they do not seem to prevent the students and teachers from using them. The leadership of Medical schools must support the use of the new technologies to be part of the developing digital area and they must explore the powerful benefits to enhance the learning of the students.

ACKNOWLEDGEMENTS

REFERENCES

[1]   Touching lives through mobile health report" (n.d) GSMA and PriceWaterHouseCooper research. http://www.gsma.com

[2]   Reston VA (2012) "New Study on Physician Online Behaviours". Comscore press release. Retrieved from http://www.comscore.com

[3]   Visser BJ, Bouman J (2012, April There's a medical app for that. BMJ Careers . Retrieved from: http://careers.bmj.com/careers/advice/view-article.html?id=20007104

[4]   La sociedad de la Información en España 2013 (2014, Enero) Fundación Telefónica. www.fundacion.telefonica.com

[5]   Woodford A. Yale Daily News. 2011. Aug 16 Med school gives students iPads. Press Release. http://yaledailynews.com/blog/2011/08/26/med-school-gives-students-ipads/

[6]   Gallegos A. (2013) Medical Schools Embrace Benefits of Tablets, Mobile Devices; Create New Ways of Learning. Association of American Medical College (AAMC) Reporter. Retrieved from https://www.aamc.org/newsroom/reporter/december2013/363858/mobile-devices.html

[7]   Dolan B, (2011). Nine medical schools that support mobile learning. Mobihealthnews. Retrieved from: http://mobihealthnews.com/12346/nine-medical-schools-that-support-mobile-learning/

[8]   Stanford school of Medicine eStudent. Consulted in 2014. http://med.stanford.edu/estudent/

[9]   Kiser K, (2011, April). The iPad project. Retrieved from: http://www.minnesotamedicine.com/

[10]   Geisel School of Medicine at Dartmouth Web page (2012). Retrieved from https://geiselmed.dartmouth.edu/oit/ipads/faq.php

[11]   Lewis T, (2011). First UK medical school trials the Apple iPad, Manchester Medical School. iMedicalApps post. Retrieved from: http://www.imedicalapps.com/

[12]   iPads In Health And Medicine: More Than An Information Revolution? (2012) Medical News Today. Retrieved from: http://www.medicalnewstoday.com/

[13]   Jordan P (2010, August). iPad in Education: Stanford School of Medicine Giving iPads to Students. iPad Insight. Retrieved from: http://ipadinsight.com/ipad-in-education-2/ipad-in-education-stanford-school-of-medicine-giving-ipads-to-students/

[14]   Wallace, S., Clark, M., & White, J. (2012). "It's on my iPhone': attitudes to the use of mobile computing devices in medical education, a mixed-methods study. *BMJ Open*, *2*(4), e001099–e001099. doi:10.1136/bmjopen-2012-001099

[15]   Boruff, J. T., & Storie, D. (2014). Mobile devices in medicine: a survey of how medical students, residents, and faculty use smartphones and other mobile devices to find information. *Journal of the Medical Library Association : JMLA*, *102*(1), 22–30. doi:10.3163/1536-5050.102.1.006

[16]   Vafa, S., & Chico, D. E. (2013). A needs assessment for mobile technology use in medical education. *International Journal of Medical Education*, *4*, 230–235. doi:10.5116/ijme.5259.4a88

[17]   Chu, L. F., Erlendson, M. J., Sun, J. S., Alva, H. L., & Clemenson, A. M. (2012). Mobile computing in medical education: opportunities and challenges. *Current Opinion in Anaesthesiology*, *25*(6), 699–718. doi:10.1097/ACO.0b013e32835a25f1