

REVIEW ARTICLE

Role of WhatsApp® in Medical Education: A literature Review

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ABSTRACT

Background: This review was aimed to find out the ways by which WhatsApp® has been used in medical education. A systematic review of the current literature was performed, critique of previous reviews was done and future implications were discussed.

Aim: To review the literature for an overview of existing studies on role of WhatsApp® in the context of medical education.

Methods: Three databases (PubMed, ERIC and Science Direct) were searched after defining the inclusion criteria. Role of WhatsApp® from the articles was methodically abstracted and discussed under the categories research type, study design, level of medical education of participants under study and content of study along with the use of WhatsApp® in Medical education and its perceived advantages and disadvantages.

Results: Fourteen articles met the inclusion criteria. Results showed that 40-76% of medical students had a WhatsApp® account out of which 30-60% used WhatsApp® for educational purposes. WhatsApp® was used to communicate with fellow students and faculty, share information online and participate in discussions groups.

Conclusion: WhatsApp® can be used in a myriad of aspects of medical education at the undergraduate and graduate level including discussions in chat groups, for information sharing, assignments/Project assessment, and providing feedback. More evidence is needed to reach conclusion in terms of its educational effectiveness.

Keywords: Medical Education (Mesh [I02.358.399]), Social Media, WhatsApp®

Introduction: The advent of information technology and widespread use of internet has provided an opportunity to the students of digital age to undertake mobile learning as well as learning through social media (Griesemer, 2012). Mobile learning (M-learning) is basically defined as ‘learning with mobile devices’ and has the potential to re-conceptualize teaching and learning through innovation (Dyavarishetty & Patil, 2017).

As novel as it seems, M-learning represents a whole new paradigm in forms of learning as well as cognition (Dyavarishetty & Patil, 2017). As compared to the previous generation, students of digital age are using portable laptops, smartphones, and other

Hand-held devices not only for communication but also for accessing information and socializing in virtual circles of their own (Jain & Jain, 2016).

Among the 39% of the people who have smartphones worldwide, over 80% have once used social media. Applications like Facebook, Instagram or Twitter allow users to post, comment, like and get in touch with any person all over the world, WhatsApp® on the other side, offers communication to one’s contacts only, individually or in a joined WhatsApp® group. Hence, these applications have played a pivotal role in bringing the world to be a virtual global village with easy communication. More importantly, these online social networking applications appear to serve multiple roles in today’s academics like sharing information and providing online discussion forums (Goyal, Tanveer, & Sharma, 2017). Considering that WhatsApp® accounts for 20% of the time spent on smartphones daily and that 32% of those who use it are the millennials, WhatsApp® is influencing people not only in communication but also in marketing and education (Kasch et al., 2017). As of August 2017, there are more than 1.3 billion WhatsApp® users over 180 countries of the world, making it third most famous social networking site after Facebook and YouTube. This rate is increasing at a tremendous rate. In the U.S. alone, the WhatsApp® audience had grown to 18.8 million users in 2016 and it is postulated to grow to 25.6 million users 2021 (Kasch et al., 2017).

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There is a documented role of WhatsApp® Messenger in mobile health (m- health) and it has been widely used in clinical services to facilitate communication between health professionals, patients, for public education and emerging telemedicine consultation (Ramaswamy, 2017). WhatsApp® also has a documented role in telemedicine consultations. Similarly, it is also being integrated into medical education as it is widely available and used by students as well as faculty (Conole & Alevizou, 2010). To our best knowledge, no review has been done on the role of WhatsApp® Messenger in Medical Education. This review aimed to explore the role of WhatsApp® in the context of Medical Education.

Methods: The main aim of the review was to give an overview of existing studies on role of WhatsApp® in the context of medical education. Hence the following research question was the cornerstone of the study: “In what ways has WhatsApp® Messenger been integrated into medical education?”

The following subset of questions were included in the study:

- What research types, data collection methods, specialties/ discipline and countries dominate WhatsApp® studies in medical education context?
- How is WhatsApp® used by students in medical education?
- What are teachers’ and students’ perceptions (including advantages and disadvantages) of WhatsApp® learning in medical education?

A literature search was conducted by the authors during September 2017. The data bases and search terms that were used are mentioned in table 1. The search was up to the end of August 2017. Inclusion criteria were to include the studies published in English language in the past 5 years starting from September 2013 to August 2017 and described the utility of WhatsApp® in medical education. Papers reporting the use of WhatsApp® solely for clinical services, patient reminders, issues of confidentiality or data encryption were excluded. Figure 1 shows the flowchart of literature search and how final number of publications was achieved. Data from these studies was extracted on the year of publication, country of origin of the paper, discipline involved, level of medical education (undergraduate, postgraduate, continuing) type of use reported (discussions, chat groups, information sharing, assessments, assignment/projects), perceived advantages and disadvantages of using WhatsApp in medical education. (See Table 2: Descriptors of the studies under review)

Table 1: Databases and search terms used

Database	Search Terms
PubMed	WhatsApp (All fields), AND ‘Medical Education’ ((“WhatsApp” [All Fields]) AND (“education, medical”[MeSH Terms] OR (“education”[All Fields] AND “medical”[All Fields]) OR “medical education”[All Fields] OR (“medical”[All Fields] AND “education”[All Fields]))
Science Direct	WhatsApp (All fields), and Medical Education (All fields)
ERIC	WhatsApp (All fields), and Medical Education (All fields)
Google Scholar	(“WhatsApp” AND “Medical education”).

Results: Our initial literature searches over the four databases resulted in 439 titles with the given Search words published from September 2013 to August 2017 (Figure 1). After abstract and full-text review, these articles were screened down to 41. Out of these, 14 publications were selected for study which fulfilled inclusion and exclusion criteria.

Table 2: Descriptors of the studies under review

Categories	Sub-categories
Year of Publication	
Country of origin of paper	
Discipline Involved	
Level of medical education	Undergraduate Postgraduate Continuing medical education
Research Methodology	Qualitative Quantitative Mixed
Data Collection	Questionnaires Interviews Application generated data
Type of Use reported	Chat groups Discussions Information sharing Assignments/Project Assessment Feedback
Advantages of WhatsApp in Medical Education	
Disadvantages of WhatsApp in Medical Education	

When analyzed according to the year of publication, nine out of fourteen publications were from 2017 (Bakshi & Bhawalkar, 2017; Dar et al., 2017; Dr.D.Parveen Sam, 2016; Dyavarishetty & Patil, 2017; Gon & Rawekar, 2017; Goyal et al., 2017; Harshe et al., 2017; Raiman, Antbring, & Mahmood, 2017; Ramaswamy, 2017; Santos, Leite, Figueiredo, & Melo, 2017), three in 2016 (Blumenfeld & Brand, 2016; Jain & Jain, 2016; MI & Meerasa, 2016) and one each in 2015 (Dambal et al., 2015) and 2014 (Khattoon, Hill, & Walmsley, 2015).

The studies were analyzed according to country or origin. Two studies were done in UK (Khattoon et al., 2015; Raiman et al., 2017), one each was from Brazil (Santos et al., 2017), Israel (Santos et al., 2017) and Pakistan (Dar et al., 2017). Rest of the publications (nine out of fourteen) were from India (Bakshi & Bhawalkar, 2017; Dambal et al., 2015; Dyavarishetty & Patil, 2017; Goyal et al., 2017; Harshe et al., 2017; Jain & Jain, 2016; MI & Meerasa, 2016; Santos et al., 2017).

The articles were then organized according to the educational levels of students who participated in the selected studies.

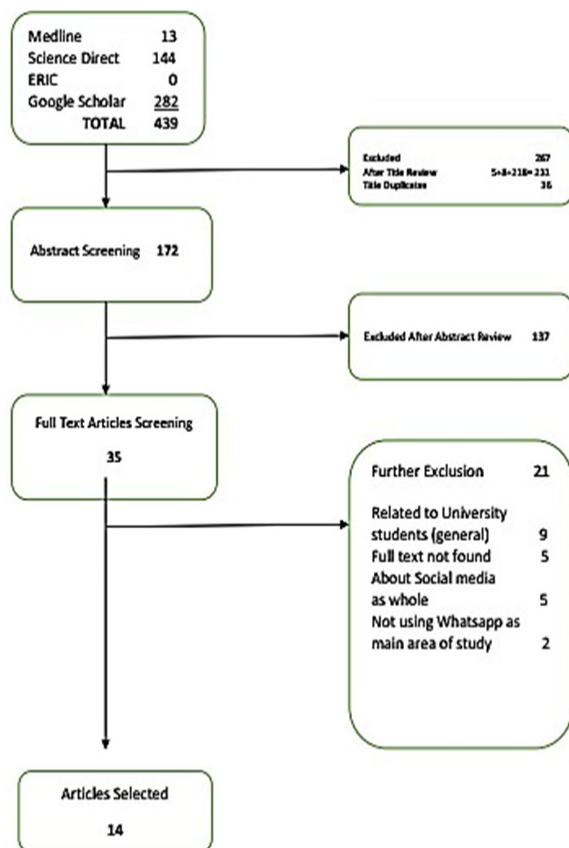


FIG I: Flow Chart of Literature Search

Majority (ten out of fourteen) studies were done on under-graduate Students (Dar et al., 2017; Dyavarishetty & Patil, 2017; Gon & Rawekar, 2017; Harshe et al., 2017; Jain & Jain, 2016; Khattoon et al., 2015; MI & Meerasa, 2016; Raiman et al., 2017; Ramaswamy, 2017; Santos et al., 2017). There were 3 studies involving post-graduate students (Bakshi & Bhawalkar, 2017; Dambal et al., 2015; Dyavarishetty & Patil, 2017) and only one study on continuous medical education (Blumenfeld & Brand, 2016).

Next analysis revealed various specialties involved. Four publications contained participants from multiple specialties, another three were from Pathology alone (Gon & Rawekar, 2017; Goyal et al., 2017; Kumar & Sharma, 2017; Ramaswamy, 2017). Rest of the publication were single from each of the discipline of dentistry (Khattoon et al., 2015), anesthesia (Bakshi & Bhawalkar, 2017), ophthalmology (Dar et al., 2017), physiology (MI & Meerasa, 2016), community Medicine (Dyavarishetty & Patil, 2017), medicine (Blumenfeld & Brand, 2016) and radiology (Santos et al., 2017).

When analyzed according to research methodology, majority of studies were quantitative (ten out of fourteen), one out of fourteen was qualitative (Khattoon et al., 2015) and rest three had mixed study design. Quantitative studies varied from survey-based (one out of ten) (Jain & Jain, 2016), cross-sectional (three out of ten) (Blumenfeld & Brand, 2016; Harshe et al., 2017; Jain & Jain, 2016) to interventional studies (six out of ten) (Bakshi & Bhawalkar, 2017; Dambal et al., 2015; Dar et al., 2017; Dyavarishetty & Patil, 2017; Goyal et al., 2017; Ramaswamy, 2017).

Only two interventional studies had interventional design involving control group for comparison as well as both pre-test and post-test to measure the effectiveness of WhatsApp[®] (Dyavarishetty & Patil, 2017; Gon & Rawekar, 2017). On the other hand, two studies were interventional but without control groups (Bakshi & Bhawalkar, 2017; Dambal et al., 2015). Rest two interventional studies did not mention pre-test and post-test at all (Goyal et al., 2017; MI & Meerasa, 2016).

Next, the utility of WhatsApp in medical education helped us conclude that majority of the studies have emphasized on the educational aspect of WhatsApp[®] in medical education in the form of small group teaching (Goyal et al., 2017; Khattoon et al., 2015; Santos et al., 2017), discussion forums (Bakshi & Bhawalkar, 2017; Dyavarishetty & Patil, 2017; Goyal et al., 2017), clarifying concepts (Dyavarishetty & Patil, 2017), giving feedback (Dyavarishetty & Patil, 2017) and revising for exams (Dyavarishetty & Patil, 2017; Khattoon et al., 2015). Some of the studies have mentioned the organizational role of WhatsApp[®] in terms of information sharing (of all sort) (Blumenfeld & Brand, 2016; Goyal et al., 2017; Jain & Jain, 2016; Raiman et al., 2017) as well as time scheduling (Dambal et al., 2015).

Table 3: Categories and Subcategories identified in Role of WhatsApp in education

Categories	Sub-categories
Social	Communication amongst students (Khatoon et al., 2015) Communication with faculty (Jain & Jain, 2016)
Organizational	Information Sharing Course content (Goyal et al., 2017) Updated information (Jain & Jain, 2016) Guidelines sharing (Blumenfeld & Brand, 2016) About general infrastructure (Blumenfeld & Brand, 2016) Time Scheduling for meetings (Raiman et al., 2017).
Educational	Small Group teaching (Goyal et al., 2017; Khatoon et al., 2015; Santos et al., 2017) Discussions and new information (Bakshi & Bhawalkar, 2017; Goyal et al., 2017) Queries (Bakshi & Bhawalkar, 2017; Goyal et al., 2017) and Clarifying concepts (Dyavarishetty & Patil, 2017) Feedback (Dyavarishetty & Patil, 2017) and Exam Revision (Dyavarishetty & Patil, 2017)
Personal	For Mind refreshment (Jain & Jain, 2016)

When outlining the perception of students regarding use of WhatsApp in medical education, majority of students welcomed and liked the idea of using WhatsApp® as a tool for teaching and learning. The perceived advantages included WhatsApp® having ease of access (Dambal et al., 2015; Dar et al., 2017), free of cost (Dyavarishetty & Patil, 2017), with learning-on-the-go (Khatoon et al., 2015), information sharing (Jain & Jain, 2016; Raiman et al.,

2017) and faculty availability round the clock (Table 4). On the other hand, commonly reported disadvantages included message flooding (Khatoon et al., 2015; Ramaswamy, 2017), faculty annoyance (Goyal et al., 2017; Khatoon et al., 2015), diminishing boundaries with private life (Bakshi & Bhawalkar, 2017; Jain & Jain, 2016; Khatoon et al., 2015), and other physical problems encountered with increased screen usage (Dyavarishetty & Patil, 2017; Harshe et al., 2017). (Table 5).

Table 4: Advantages of using WhatsApp

Categories	Sub-categories
Technical	Simple to use (Gon & Rawekar, 2017) Free (Gon & Rawekar, 2017) Easily Available for download (Dar et al., 2017; Gon & Rawekar, 2017; Goyal et al., 2017) Instant/fast (Khatoon et al., 2015)
Educational	Conducive Environment (Gon & Rawekar, 2017) Sense of belonging to one group (Gon & Rawekar, 2017) Enable continuous interaction amongst students (Khatoon et al., 2015) Doubts immediately cleared (Santos et al., 2017) Access to recorded discussions (Raiman et al., 2017) Feedback provision (Santos et al., 2017)
Instructional	Learning any time/anywhere (Dar et al., 2017; Gon & Rawekar, 2017) Facilitator 'at-hand' (Goyal et al., 2017) Secure environment (Gon & Rawekar, 2017)

Table 5: Disadvantages of using WhatsApp

Categories	Sub-categories
Technical	Need to own smart phone(Gon & Rawekar, 2017) Internet-dependent(Gon & Rawekar, 2017; MI & Meerasa, 2016) Flooding of messages(Gon & Rawekar, 2017) Time consuming and group maintenance (Gon & Rawekar, 2017) Lack of focus (Dambal et al., 2015) Interruptions in class (Dyavarishetty & Patil, 2017; Jain & Jain, 2016)
Educational	High expectation of facilitator's availability(Gon & Rawekar, 2017) Faculty annoyance issues(Dyavarishetty & Patil, 2017; Goyal et al., 2017; Khatoon et al., 2015) Huge cognitive load at hand(Khatoon et al., 2015) Lack of synchronous clarification of concepts at times (Dambal et al., 2015)
Instructional	Lack of face to face interaction (Dambal et al., 2015; Raiman et al., 2017) Lack of students' independent study(Khatoon et al., 2015) Developing reliance on tutors for answers(Khatoon et al., 2015) Pasting others' answers as one's own (Dar et al., 2017; Santos et al., 2017) Sharing for sake of impressing others only (Dyavarishetty & Patil, 2017)
PERSONAL	Fading boundaries with private life(Khatoon et al., 2015) Sociocultural consequences affecting work and personal relations ¹⁴ Physical Symptoms: (Dyavarishetty & Patil, 2017): Eye strain, blurred vision, altered sleep (Harshe et al., 2017) and tiredness

Discussion: With the boom of social media, some systematic reviews, have explored the role of social media and social networks in medical education in general (Conole & Alevizou, 2010; Griesemer, 2012; Maton & Kervin, 2008; Van De Belt, Engelen, Berben, & Schoonhoven, 2010). Arnbjörnsson (2014) gave an overview on a variety of social media applications used in undergraduate medical education and the ways they have been integrated into learning and teaching. However, authors are not aware of a systematic literature review that summarizes the specific use of WhatsApp® in medical education tool currently available.

WhatsApp®, in particular, is very popular amongst the students (Kasch, Haimerl, Arlt, & Heuwieser, 2016) and its impact is spreading among both undergraduate and postgraduate medical students along with faculty. In our review of 14 studies, 40-76 % of students use WhatsApp messenger® for communicating and interacting with others whereas 30-60% use it for educational purposes. Plana et al examined the use of WhatsApp in improving the reading skills of English language and reported that there was an increase in motivation amongst students to learn while using WhatsApp® (Kasch et al., 2017).

The review highlighted factors contributing to the use of WhatsApp® for learning purposes. WhatsApp® is reported to be an attractive option for online communication with fast, simple, secure messaging, free of cost. Another plus point is that it also functions across different smartphone types (Android, BlackBerry, IOS etc.). Advent of WhatsApp®

Web has stretched its function to personal computers as well. Recently, the end to end encryption of data has addressed the previous issue of data security on the application security (Cetinkaya, 2017).

An attractive feature of WhatsApp in educational settings remains the ability to form discussion groups for information sharing without any transfer capacity constraints. Even at the inception of WhatsApp® in 2010, the purpose of developing this application was to replace the old social messaging system, with a free-of-cost program to allow easy data transfer (Dr. D. Parveen Sam, 2016). Hence, since then WhatsApp® has been delivering its purpose in community with increasing evidence in educational settings. Overall, students are embracing the idea of using WhatsApp® learning tool, which is fast, instant and always at hand.

On the downside, WhatsApp has some issues. Being always-at-hand poses problems to faculty member leading to faculty annoyance due to message flooding without any time constraints (Khatoon et al., 2015). Therefore, when used without a set protocol, WhatsApp® may become a nuisance in disguise. Also, always-at-hand does not always mean always-available to answer leading to frustrating students and hindering their learning process (Dyavarishetty & Patil, 2017). Waiting for correct solutions to queries may make student 'lazy' and relying too much on the facilitator, which is against the theory of social constructivism upon which the educational framework for WhatsApp® seems to lie on (Jain & Jain, 2016; Raiman et al., 2017).

Few studies have been done to assess the effectiveness of WhatsApp® in learning in medical education (Bakshi & Bhawalkar, 2017; Dambal et al., 2015; Dyavarishetty & Patil, 2017; Gon & Rawekar, 2017; Goyal et al., 2017; MI & Meerasa, 2016; Ramaswamy, 2017). These are limited by fewer number of participants, limited to one study session only, technological constraints and also lacking in quality of methodological design (either missing control group or pre-test or post-test).

Future directions should aim towards more focused studies working on the usage of WhatsApp in medical education amongst undergraduate, postgraduate and in continuing medical education separately. Domains like WhatsApp utility affecting work and daily life activities should be correlated objectively to answers the 'taboo' related to use of Social media in medical education. This digital time and era also demand for more structured, comprehensive interventional trials to determine the effectiveness of WhatsApp in learning itself in medical education.

Conclusion: WhatsApp® can be used in a myriad of aspects of medical education at the undergraduate and graduate level including discussions in chat groups, for information sharing, assignments/ Project assessment, and providing feedback. Despite an increase in the use of WhatsApp® in medical education, there is a lack of conclusive evidence in terms of its educational effectiveness.

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