



# Use of WhatsApp in Dental Education: a Scoping Review

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## Abstract

**Purpose/Objective** This study aimed to perform a critical appraisal of WhatsApp use by undergraduate students in dental education.

**Methods** A PRISMA-Scoping Review was carried out to explain (i) how has WhatsApp been used as a learning tool in dental education? and (ii) how has WhatsApp been evaluated as a learning tool in dental education? Inclusion criteria are specified as the population (dental students), concept (use of WhatsApp), context (institutions/universities of dental education), and types of sources of evidence (peer-reviewed publication).

**Results** Nine studies published between 2016 and 2020 were included in this scoping review. Mostly had a cross-sectional design.

**Conclusion** WhatsApp is used in dental education to facilitate communication and improve learning through discussions via the app.

**Keywords** Communication skills · Dentistry · E-learning/Computers · WhatsApp · Social media

## Introduction

Although it has undergone numerous changes in recent years, traditional education still has several characteristics that do not match contemporary standards. This teaching model is based mainly on the transmission of knowledge from teachers to students [1]. In this sense, the dialogue between teacher-student, which is the basis of the learning process, becomes impaired. Moreover, teachers who use the traditional format limit their teaching methodologies to expository classes, annulling the possibilities of working on student autonomy to become the protagonists of the teaching–learning process [2].

Therefore, it is essential to work on students' interpretative autonomy to contribute to the formation of professionals capable of acting efficiently in the situations that arise

in their daily work activities [2]. To this aim, technologies emerge as unavoidable tools for managing and supporting teaching and learning processes. In this process, these tools assume a relevant role, as they provide students with conditions to expand access to information, acquisition, and sharing of knowledge, promoting their autonomy, collaboration, participation, and interaction with the various learning spaces [3].

Then, technologies have been gaining space each day in the educational field due to their several advantages, besides the ease of access and acceptance of the new generation. Consequently, the teacher needs to make technologies a pedagogical work methodology [4]. In this sense, social media, which are interactive platforms that allow the creation and exchange of content generated by users, are an alternative. Moreover, there is a rapid growth of these platforms, and the complexities are decreasing every day, resulting in more user-friendly apps [5]. Among social networking apps for smartphones, WhatsApp has become the most accepted and conveniently used. Furthermore, its use has increased significantly since its launch in 2009 [6], with more than 2 billion users nowadays [7].

Regarding this issue, emerging technologies, including social media apps such as WhatsApp, are becoming more frequent in higher education, and this is also a reality for

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health sciences [8]. These apps in medical and dental education have proven to increase student participation, improve the feedback process, and improve communication between student and tutor [9]. WhatsApp is the social media app most popular among dental students due to its facility of keeping in touch with friends or family [10]. Thus, the integration of WhatsApp in educational courses allows its users a variety of resources, and therefore teachers and students are encouraged to use the apps in education due to its positive qualities and resources that increase understanding [11]. However, some limitations about empirical education research on this issue remain poorly reported.

Based on this, many studies indicate that social media, such as WhatsApp, can be used in education. Thus, this article aims to map and synthesize information about how WhatsApp has been used and evaluated as a learning tool in dental education.

## Methods

### Protocol and Registration

The study's protocol was drafted using a modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews-PRISMA-ScR [12] -and the model for scoping review proposed by Arksey and O'Malley [13]. The final protocol was registered with the Open Science Framework (RRID:SCR\_003238) on 10 December 2020 (<https://osf.io/tn3c4>).

### Identifying the Research Questions

To identify the research questions, the proposed questions by Coleman and O'Connor [14] were modified: (i) How has WhatsApp been used as a learning tool in dental education? (ii) How has WhatsApp been evaluated as a learning tool in dental education?

### Eligibility Criteria

Studies were included since (i) it was a peer-reviewed publication (including case reports and letters); (ii) it aimed was related to the use of WhatsApp by dental students; and (iii) it was written in English, Portuguese, or Spanish. No year restriction was applied. We excluded publications with secondary data (e.g., reviews or book chapters) and letter to the editor. The eligibility criteria are in line with the Joanna Briggs Institute Reviewer's Manual [16], once the detailed inclusion criteria are specified as the population (dental students), concept (use of WhatsApp), context (institutions/universities of dental education), and types of sources of evidence (peer-reviewed publication).

## Search Strategy and Information Sources

The search strategy used the association of Boolean descriptors and operators, as follows: (WhatsApp OR "mobile message" OR "instant messages") AND ("dental education" OR "dental student" OR "dental undergraduate").

The following bibliographic databases were used: PUBMED, EMBASE, SCOPUS, ScienceDirect, Web of Science, and SciELO. The final search results of each database were exported and downloaded in CIW or RIS format. The files were imported into the online platform of Rayyan QCRI (RRID:SCR\_017584), and duplicates were removed.

### Selection of Sources of Evidence

For the selection of eligible studies, the Rayyan was used [17]. Based on the eligibility criteria, two reviewers (JCSM and JBL) independently evaluated the same titles, abstracts, and full text of all publications identified by the searches. The disagreements on study selection and data extraction were resolved by consensus and discussion with a third reviewer (PHSS), when needed. The intra- and interobserver kappa coefficients were performed using 70% of previous identified studies. The selection of sources was carried out until 27 November 2020.

### Data Charting Process

Appropriate study data were condensed in tabulated form for each study. We analyzed the variables related to the authors' name, year of publication, place of development of the research, aims/question, study population/sample size (when applicable), methodology, intervention type (when applicable), concept, how outcomes are measured, and key findings that relate to the review question.

### Synthesis of Results

After data tabulation, a narrative approach to summarizing and reporting the data was adopted. The results were presented and discussed according to our two research questions.

## Results

### Summary of the Articles

A total of 66 titles were retrieved using the search strategy. After duplicate removal, 44 unique studies were evaluated independently by reviewers through eligibility criteria (Fig. 1). The intraexaminer kappa coefficient was 0.90 (CI 0.58–1.00), and the interexaminer was 0.84 (CI 0.72–0.91).

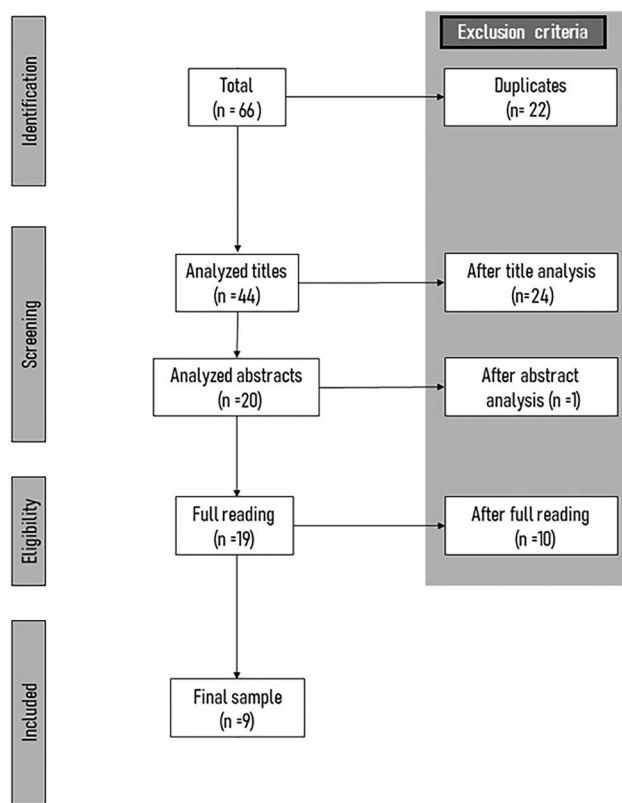


Fig. 1 Scheme of the selection of works

Finally, nine studies published between 2016 and 2020 were included in this scoping review (Table 1).

Seven (77.7%) studies had a cross-sectional design, one (11.1%) was a case report, and another (11.1%) was a clinical trial. On the other hand, four (44.4%) addressed WhatsApp’s advantages and disadvantages and assessed whether students accepted it and whether it is a useful dental education tool. The other ones, three (33.3%) evaluated the use of WhatsApp and other social media, one (11.1%) compared the application with e-mail, and another (11.1%) compared it with a Virtual Learning Environment (Moodle Platform). Most studies ( $n = 8$ ; 88.9%) were carried out at a university, while one (11.1%) was a multicenter study.

### How Has WhatsApp Been Used as a Learning Tool in Dental Education?

Most studies ( $n = 4$ ; 44.4%) evaluated the use of WhatsApp and other social media as facilitators of the teaching–learning process for exchanging messages and sending multimedia files. One study (11.1%) compared WhatsApp with electronic e-mail in students’ and teachers’ communication, which considered the time for receiving and responding to messages sent in these tools. Another (11.1%) compared WhatsApp with a Virtual Teaching Environment (Moodle Platform). The following items

were compared: querying doubts, obtaining information, communicating with teachers, and communicating with colleagues.

One of the works (11.1%) reported the use of the application as a means of communication to promote discussions between the teacher and the students; two others (22.2%) showed that it can be used to share files and information relevant to dental education and that it can be useful to help make clinical decisions.

### How Has WhatsApp Been Evaluated as a Learning Tool in Dental Education?

#### Technical/Logistical Aspects of the Medium

The selected articles presented information on the technical/logistical aspects of WhatsApp. Among the advantages mentioned, the main one was speed. This ability to send instant messages makes it possible to clarify doubts quickly. The possibility of exchanging information and using multimedia resources were also benefits related to the application.

Concerning other messaging tools, such as e-mail, WhatsApp could verify that it has been delivered and read. The ability to send a group message at once was an advantage and a factor contributing to a large amount of this information not being relevant to specific individuals in the group. The technical disadvantages mentioned were technology limitation for cell phones, dependence on the internet connection, and vulnerabilities in professional secrecy and information without details.

#### Learner/Learning Activity During WhatsApp Discussions

Seven studies showed the content covered with the use of the application. The resource for sending multimedia files was the most used to promote discussions and learning. These included videos, images, and audio. Other positive uses were ease of communication with teachers and monitors in administrative and clinical matters and access to didactic material.

One of the works motivated learning mainly through textual involvement, with the elaboration of questions and problems. Through discussions on essential immunology/microbiology topics directly related to SARS-CoV-2, the professor stimulated through news, social media posts, and serological tests while safeguarding ethical principles.

#### Educational Outcomes of the Medium

Most studies ( $n = 6$ ; 66.6%) evaluated the application’s use through questionnaires answered by students who use this instrument. These studies showed that this resource allows students to obtain more information on different subjects, makes education more engaging, and improves the capacity for creativity and innovation, and assists clinical decisions.

**Table 1** Summary of the main topics of the included studies

Author/year	Question/aim	Design	Method	Conclusion
Poblete and Nieto / 2020 [24]	To compare the reception and response time of WhatsApp with the traditional electronic e-mail within the dental educational environment	Clinical trial	A two-group comparative study was designed. The design included four multiple-choice questions which were sent via WhatsApp and via electronic mail (eM group). Data collected focused on the reception time and response time of students. Specifications of WhatsApp were used to collect data while an email tracker was used for the eM group. Excel software and Stata/IC version 15.1 software were used for data analysis	WhatsApp seems to be more efficient in terms of reception and response time compared to electronic email
Khattoon et al. / 2015 [23]	How dental students communicate via instant messaging (IM), faculty members' perspectives on using instant messaging to communicate with students, and whether such tools are useful in the learning environment?	Cross-sectional	After free-associating themes on online communication, two draft topic guides for structured interviews were designed that focused on mobile device-related communication activities. A total of 20 students and six faculty members at the University of Birmingham School of Dentistry agreed to take part in the interviews. Students were selected from years 1–5 representing each year group	There is an elevated level of contentment with IM use in this dental school compared to previous studies
Grilavand et al. / 2017 [21]	Investigating of the use of SNSs for dental education by students	Cross-sectional	The population of study consists of the general students of the Faculty of Dentistry of Ahvaz Jundishapur University of Medical Sciences. Sampling was practiced through census and by distributing questionnaires between all cases. Totally, 109 cases filled the questionnaire. Data was analyzed using SPSS 22	The universities of medical sciences should integrate social media education and policies into curricula to ensure that students are making the most of these digital assets and are doing so with the least possible risk
Sette-de-Souza / 2020 [19]	How did keep students motivated to learn?	Case report	The adoption of 2 measures was sought: discussions via WhatsApp and weekly meetings at Google Meet	Regular and short-interval engagement with students during social isolation circumstances by remote tools provided a safe and effective learning environment at this difficult time
Tapia-Repetto et al. / 2019 [15]	What is the perception of dentistry students regarding the use of WhatsApp (WAP) and Virtual Learning Environments (VLE) in different plans that involve communication and access to information?	Cross-sectional	To obtain information, a written face-to-face survey that was completed by the students. It presented an initial segment referred to the WAP application and another for the VLE. In the items referring to VLE and WAP the following items were evaluated: consult doubts, get informed, interact with the teacher and interact with classmates The items were valued from 0 to 12 points, from according to the university grading scale of the Udelar	There is a high degree of acceptance of the different technologies, WhatsApp communication being more widely accepted than communication in the Moodle Platform

**Table 1** (continued)

Author/year	Question/aim	Design	Method	Conclusion
Rajeh et al. / 2020 [4]	What is the perception of dental students for implementing social media as an educational tool?	Cross-sectional	A validated questionnaire was used to explore social media use and student perceptions on the advantages and disadvantages of implementing social media in dental education. Descriptive statistics and Pearson's $\chi^2$ , Kruskal–Wallis, and Fishers' exact tests were used for data analysis	Students report social media can be a valuable learning tool in dental education if appropriately used. A proper understanding of social media and its usefulness in supporting learning can benefit both students and faculty members
Souza et al. / 2019 [20]	To evaluate dental student perception (adherence and applicability) about the inclusion of social media (Facebook, WhatsApp, and Instagram) as learning tools for teaching infection prevention and control	Cross-sectional	This research sample was formed by the students enrolled in the discipline of Biosafety and Ergonomics 2, at Federal University of Pernambuco-Brazil, between 2014 and 2017 ( $n = 371$ ). They answered a questionnaire survey in which the adherence, applicability and use of social media were evaluated as educational platforms. The academic performance (scores) of the interviewees on the discipline was compared to the results obtained by students who did not have access to social media for educational purposes in previous semesters (2011 to 2014)	Most students adhered to social media and considered them to be advantageous infection prevention and control study platforms. This inclusion did not have negative impact on students' academic performance
Souza et al. / 2017 [27]	Evaluate the opinion of dental students about the inclusion of social networks—Facebook, WhatsApp, and Instagram—as platforms that facilitate learning in Biosafety	Cross-sectional	The sample consisted of students enrolled in the discipline of Biosafety and Ergonomics 2 ( $n = 53$ ), who answered a form Google's website, in which the adherence, applicability, and usefulness of social networks as educational platforms were evaluated	Young students were very receptive to the inclusion of networks aspects in the learning of Dental Biosafety, highlighting the media studied social media with advantageous methods in learning process, with specific uses depending on the tool used
Saraiva et al. / 2020 [26]	Describe the evaluation of the Podcast, sent by WhatsApp, in the learning process of dental students	Cross-sectional	The sample consisted of 47 students from a dental school. For the experience, articles in PDF format from the theoretical classes were recorded using conventional headphones and the application Speaker REC. Subsequently, the link was sent to the WhatsApp group so the students could access the audio. Three podcasts were made. The information was collected through surveys using a Lickert-type survey	Students consider that podcasting is a tool that contributes to their learning, particularly as a very useful vehicle for learning theoretical content

One of the studies used the file-sharing feature, in which podcasts were sent with issues related to dentistry and concluded that the application is an excellent alternative to be used for this purpose and is useful for dental education. In another study, WhatsApp was also considered a useful tool to communicate and motivate students. In this study, discussions were proposed using the application, which resulted in greater student involvement, who voluntarily shared the excitement of learning and recommended other activities.

Only one study compared the result obtained with WhatsApp with the result of a group that did not use the application. However, the comparison of test scores obtained by students enrolled in the course before and after social media inclusion does not indicate a statistically significant difference between the questions. Another study compared the students' assessments for WhatsApp and the Moodle Platform, and the results showed that WhatsApp obtained a higher score on all items evaluated.

Another study cited the main disadvantages, including study distraction, increased dependency potential, more time spent, and concerns about not having direct contact with instructors (Rajeh et al., [4]). Nevertheless, it recognizes that social media can be a valuable learning tool in dental education if appropriately used.

## Discussion

This review presents several aspects of the use of WhatsApp by undergraduates in dental education. Most studies were cross-sectional and used questionnaires pre-defined by pilot studies or were pilot studies. All the studies were related to the use of the application in the university environment. The papers that addressed educational issues with this tool showed that WhatsApp is a useful tool for the teaching–learning process in dentistry.

Communication and the tools to develop them are essential in education. Especially in recent years, with the arrival of new technologies, the challenge arises to transform them into tools that collaborate with the teaching–learning process. In this sense, there is the agreement that these technologies are instruments capable of enhancing higher education [15].

The utility of using the WhatsApp application in daily clinical decisions was studied [18]. It was possible to verify that the application was useful for 85.71% of the interviewees. Regarding the utility of the application for studying, the results showed that this was useful for 88.10% of the interviewees. Thus, WhatsApp was considered a useful tool for accessing information and supporting the teaching–learning process and clinical decisions.

Another paper considered the WhatsApp a useful tool to communicate and motivate students, especially during

times of social isolation [19]. In this study, discussions were proposed using the app, which resulted in greater student engagement, who voluntarily shared learning excitement, recommending additional gatherings and other activities. On the other hand, neither all identified studies reported a plan to use WhatsApp or if all students contributed to the exchange of messages or only the educator. We believe this knowledge gap should be better explained in further studies.

WhatsApp is one of the most used social media by dentistry students and has several benefits when used for dental education [4, 20, 21]. The main advantages observed in these studies include the following: faster and easier communication [22], helping to obtain more information on different subjects, making education more engaging, providing a better chance of accessing new resources, improving the capacity for creativity and innovation, and improving research skills. In contrast, the predominant disadvantages were a distraction from studying, increased addictive potential, increased time spent, and concerns over no direct contact with the instructors [4].

Besides that, the effectiveness of WhatsApp concerning electronic e-mail regarding the response time of messages was observed [24]. WhatsApp has several benefits to be used as a means of communication between students and teachers, such as being more instant and allowing confirmation that messages were delivered and read since this is not possible when using e-mail [23]. Moreover, WhatsApp was defined as a useful tool for students' communication and obtained a superior evaluation than Virtual Learning Environment-VLE [15].

The main strength of this review is the use of a transparent and reproducible procedure. Our protocol presents a detailed description of the population, concept, context, data sources, search strategy, data extraction, and analysis. However, we limited the review to only studies focused on undergraduate dental education. We strongly believe that our review will help professors who plan to use WhatsApp in dental education. In this scoping review, we will not assess the impact of simulation intervention nor the quality of the identified interventions [4, 11, 14, 16, 24–27].

## Conclusion

Therefore, most of the selected studies have shown that WhatsApp is a useful tool to be used as an ally of pedagogical activities, both in the exposure of information and in providing collaborative and interactive spaces between learners, and is more efficient than other applications. Thus, the referred application presents itself as a simple digital communication tool between teachers and students and can strengthen the bridge between education and technology.

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**Availability of Data and Material** <http://scopus.com/>; <http://pubmed.ncbi.nlm.nih.gov/>; <https://www.embase.com/>; <http://isiwebofknowledge.com>

## Declarations

**Conflict of Interest** The authors declare no competing interests.

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