

Evaluation of Social Media in Teaching in Oral Radiology

Murilo Miranda-Viana*, Danyel Elias da Cruz Perez**, Laís Cesar de Vasconcelos***, Andrea dos Anjos Pontual****, Flavia Maria de Moraes Ramos-Perez*****, Maria Luiza dos Anjos Pontual*****

Abstract

Purpose: This study aimed to evaluate the use of social media (Facebook and Instagram) in the teaching-learning process in Oral Radiology I and II of the dentistry courses. **Materials and Methods:** The evaluation was based on the students' opinions and suggestions regarding a questionnaire applied to the use of social media in the classroom, complemented by the students' performance, through the analysis of general averages before and after the use of social media. All students who completed Oral Radiology I and II courses, 2 years after the implementation of social media in 2015, answered the questionnaire (n = 340). The scores were compared between 3 years before and after the start of the social media project in the courses. **Results:** There was a decrease in the number of students who needed to re-sit the test to get them approved, and an increase in the scores of students who attended the course after implementation; these factors were significant for both courses ($p < 0.05$; Mann-Whitney). They replied were satisfied and that the use of social media helped them in academic development. **Conclusion:** The use of social media contributes to increasing the academic performance of the students, establishing an interconnection between students and teachers in the construction of knowledge and pedagogical practice, and improving socialization, encouraging them to develop new projects.

Keywords: dental education, radiology, social media, technology.

* DDS, MSc student, Piracicaba Dental School, Oral Diagnosis Area, University of Campinas, Piracicaba, São Paulo, Brazil. E-mail: muriloomiranda@gmail.com.

** DDS, PhD, Professor, Department of Clinical and Preventive Dentistry, Universidade Federal de Pernambuco, Recife, Brazil. E-mail: danyel.perez@ufpe.br.

*** DDS, PhD, Department of Clinical and Preventive Dentistry, Universidade Federal de Pernambuco, Recife, Brazil. E-mail: laiscv@uol.com.br.

**** DDS, PhD, Professor, Department of Clinical and Preventive Dentistry, Universidade Federal de Pernambuco, Recife, Brazil. E-mail: andrea.apalima@ufpe.br.

***** DDS, PhD, Professor, Department of Clinical and Preventive Dentistry, Universidade Federal de Pernambuco, Recife, Brazil. E-mail: flavia.ramosperes@ufpe.br.

***** DDS, PhD, Professor, Department of Clinical and Preventive Dentistry, Universidade Federal de Pernambuco, Recife, Brazil. E-mail: luiza.apontual@ufpe.br.

1. Introduction

The socio-cultural and educational transformations were built with technological advances. The web, including social media such as Facebook and Instagram, is one of the most widely used media by college students for the wide range of immediate data sources. And today, healthcare students expect their teachers to effectively use information technologies to enhance their learning (Echavarría, 2013; Flynn, 2015).

Social media is a group of applications based on the internet or interactive platforms that allow users to create and/or exchange content. Depending on the form of its use in the teaching-learning process, in addition to strengthening this process, by facilitating participatory learning and acting as a constructive tool for teaching and learning, open new possibilities for teaching strategies (Latif, 2019; Rozgonjuk, 2018).

The use of mobile technologies, such as smartphones and laptops, has increased considerably and is enhancing academic research by both students and teachers. Thus, in higher education, the use of these technologies, adapted to the teaching-learning process, is a challenge. Many works have used social media in higher education, justifying the perspective of learning expansion, creating a more dynamic, attractive and contextualized approach, and diversifying pedagogical practice (Rozgonjuk, 2018; Samaha, 2016; Robert, 2013).

One of the positive achievements of the use of social media in pedagogical practice is in contributing to the academic growth of students, and favors direct approval in the subjects, where they get enough grade to get approval without the need for a final exam (second test), when they don't get enough grade. Studies, in the consulted literature, evidenced the use of social media with these results (Stein, 2014; Abdelkarim, 2014).

Currently, the relationship between using technology inside and outside the classroom to improve pedagogical practice is still widely discussed in the literature. Some studies justify that the use of technology impairs academic performance (Robert, 2013) by distracting students from their activities, but it is important to state that the design and use of these tools are key to achieving the purpose of improving learning (Bahner, 2012). From this perspective, dental school teachers are beginning to use various forms of social media to effectively educate students and adjust pedagogical methodology with the new generation (Cheston, 2013; Rocha Júnior, 2014).

Oral radiology is the specialty of dentistry that deals with obtaining and interpreting radiographic and tomographic images of the buccomaxillofacial complex. The use of social media for evaluation, interpretation, and discussion of cases in radiographic and tomographic images is an important resource in teaching oral radiology. In addition, the implementation of social media in dental

radiology makes it easier to share knowledge and develop new skills. Therefore, the aim of this study was to evaluate the use of social media in the teaching-learning process on the oral radiology discipline in a dental school in Brazil.

2. Materials and Methods

This study was approved by the Local Research Ethics Committee (protocol 1.479.866) and was in compliance with the Declaration of Helsinki.

Based on the process of using social media to improve teaching, research, and interconnection between the actors in the teaching-learning process and to increase interest in information production and the development of new skills, the oral radiology course at the Universidade Federal de Pernambuco (UFPE), Recife-Brazil, created a Facebook page (Radiologiaufpe) and Instagram profile (@radiologiaufpe) in 2015. This course is taught in the second year of the dentistry course, divided into two courses, Oral Radiology I and II, being these courses the objects of the research.

The research was divided into 2 moments: The first moment was determined by applying a questionnaire, and the second, by comparing the academic performance of students who had access to social media in the subjects and those who did not. For the application of the questionnaire, the sample consisted of 340 dental students from UFPE. The participants were third and fourth-year dental students who had already completed Oral Radiology I and II and had access to the social media of the discipline. All participants voluntarily signed an informed consent form before the study began.

The questionnaire was composed of 16 multiple-choice questions about the use of social media as an instrument to facilitate learning (Figure 1). Importantly, the purpose of applying the questionnaire was only to assess students' satisfaction with the association of technology and pedagogical practice and how fundamental they think this association is in enhancing their learning.

The questionnaire was validated before the study. A total of 60 students, who had completed both disciplines previously, were selected randomly. They studied the questionnaire over 1 week and reported to the researcher if any questions raised doubts. This led to some adjustments, making this research instrument more efficient and attesting to the accreditation of the research (Kitchenham, 2002; Cho, 2017). After validation, the questionnaire was completed by the participants in the study.

For the second moment of the research, the mean scores for students in Oral Radiology I and II, 3 years before the use of social media (2012, 2013, and 2014) and 3 years after (2015, 2016, and 2017), were obtained with the objective of analyzing the influence of social media on the performance of

students' theoretical and practical evaluation activities, being the questionnaire applied, only an auxiliary in the perspective of the results found. It is relevant to inform that during these 6 years, there was only a change in the curriculum of the course, but it did not affect the oral radiology courses, and that the teachers of the subjects were the same throughout this period.

Figure 1 - The questionnaire used in this study

QUESTIONNAIRE

Please complete this questionnaire to help us identify student uses and attitudes regarding the use of social media for the learning of Dental Radiology.

1. Age:
2. Genre: () Male () Female
3. Which class of Oral Radiology courses were you taking?
() Radiology 1 **Daytime** () Radiology 1 **Night** () Radiology 2 **Daytime** () Radiology 2 **Night**
4. Do you have internet access?
() Yes () No
If yes, where do you most access it? (If required, select more than one option)
() At home () At University () Others
5. Do you know about the social media of the disciplines of Dental Radiology?
() Yes () No
6. Do you often access social media (Facebook and/or Instagram)?
() Yes () No
7. Which device do you most use to access the discipline's media?
() Desktop () Smartphone () Notebook () Tablet () No access
8. What is the social media of the discipline of Dental Radiology that you most access?
() UFPE Radiology (Instagram)
() Radiology I Course (Facebook)
() Radiology II Course (Facebook)
() None
9. How often do you access the social media of the discipline of Radiology?
() Daily
() Weekly
() Monthly
() I have never accessed the social media of the discipline
10. You use the discipline's social media to: (select more than one option if necessary)
() Discuss the daily content posted
() Respond to complementary activities
() Ask question on the contents
() View the academic calendar and course schedule
() Watch videos posted
() Conduct searches for didactic materials / daily publications
11. Did the social media in the discipline of Radiology bring any kind of benefit to you and your studies?
() Yes () No
If so, in what way did they help?
() In the deepening of the knowledge covered, by stimulating research in journals and academic articles
() Increased interest in discipline
() Just helped pass the test.
12. Which of the subjects posted in the social media of the course did you find most relevant?
() Clinical Cases in Cone Beam Computed Tomography
() Benign Bone Lesions () Dental Developmental Anomalies
() Radiobiology () Radioprotection () X-Ray machines
13. Which content(s) do you believe could be best approached?
() Intraoral X-ray Techniques () Extraoral X-ray Techniques
() Exposure Errors () Processing Errors () Location Methods
() Radiographic Anatomy () Periodontal Injuries () Injuries to the Dental Organ () Cystic Lesions () Fibrous Bone Lesions
14. Which of these words best describes your attitude towards the use of social media in the Radiology Discipline?
() Essential () Complicated () Irrelevant () Necessary
Innovative () () Interactive () Unnecessary
15. How satisfied are you with the use of social media in Radiology?
() Very satisfied () Satisfied () Not satisfied () Dissatisfied
16. Do you think that social media should be used by other disciplines of the Dentistry course of the Federal University of Pernambuco? () Yes () No

The Kolmogorov-Smirnov test was performed to evaluate the distribution of the samples in the Oral Radiology I and II courses, and it was verified that they did not present normal distribution ($p < 0.05$). Thus, we used percentages, average, and interquartile ranges to present the data. The chi-squared test was used to evaluate the association of social media availability and the qualitative variables.

The Mann-Whitney test was used to compare the distribution of means among the groups with and without social media, both for students who were approved directly and those who needed a second chance. The level of significance was set at 5% ($p < 0.05$).

3. Results

All students had Internet access (100%) and only 12 (6%) did not know about social media for the oral radiology courses (Facebook and Instagram). Smartphones were the main means of access ($n = 221$, 65%), followed by the notebooks ($n = 51$, 15%), computers ($n = 47$, 14%), and tablets ($n = 21$, 6%).

The Facebook pages for the Oral Radiology I and II courses were the most accessed (39% and 32%, respectively) followed by Instagram (23%). The students justified the use of the pages mainly to search for didactic materials (23%), to follow the schedules for the subjects (21%) and to resolve queries on the content taught in the classroom (20%). Videos, complementary activities, and discussions were 7%, 17%, and 12%, respectively.

Table 1 shows the distribution of the most accessed content and suggestions. Among the subjects posted daily in the social profiles, the students showed more interest in clinical cases on cone-beam computed tomography (CBCT) ($n = 110$, 29%) and examples of benign bone lesions ($n = 84$, 22%). The topics suggested for further content included radiographic anatomy ($n = 62$, 16%), fibrous-osseous lesions ($n = 56$, 15%), and exposition errors ($n = 44$, 12%). Eighty-six (26%) of the students were very satisfied with their use of social media, 225 (66%) were satisfied, 18 (5%) were not very satisfied, and 11 (3%) were dissatisfied. Most ($n = 326$, 96%) students agreed to extend the project to the other courses at the dental school.

To evaluate the effect of the implementation of social media on students' academic performance in an objective way, the distribution of groups of students with and without the availability of social media was analyzed in terms of direct approval and the need for a second test (final exam) in the courses. The students' average scores were compared considering the course and the period of implementation of the project. Table 2 shows the distribution of students approved directly with and without the influence of

social media. There was an increase in the number of direct approvals in both courses after the implementation of social media, but this was not significant for Oral Radiology I ($p = 0.063$) and II ($p = 0.870$).

Table 1. The most accessed content and suggestions

Most accessed subjects by degree of interest	N	%	Student suggestions	N	%
Clinical cases on CBCT	110	29	Radiographic anatomy	62	16
Benign bone lesions	84	22	Fibrous bone lesions	56	15
Dental developmental anomalies	73	19	Exposure errors	44	12
Radioprotection	41	11	Injuries to dental organs	43	11
X-ray machines	38	10	Location methods	41	10
Radiobiology	34	9	Cystic lesions	40	10
			Periodontal injuries	38	9
			Processing errors	36	8
			Intraoral radiographic techniques	18	5
			Extraoral radiographic techniques	15	4

Table 3 shows the distribution of students approved after re-sit the test (final exam) to reach the required grade with and without the influence of social media. There was a decrease in the number of students who had to take the final exams in both courses after the implementation of social media.

With regard to academic performance, students' scores in both disciplines were analyzed before and after the use of social media (Table 4). There was an increase in the maximum marks reached by the students after the use of social media and an increase in the average mark; these factors were significant for both courses ($p < 0.001$).

Table 2 - Distribution of students with and without availability of social media regarding direct approval for Oral Radiology I and II

Approval	Media availability, n (%)		Total, n (%)	p value
	Yes	No		
Oral Radiology I				
Yes	304 (97.1)	303 (94.1)	607 (94.1)	$\chi^2=3.446$; 0.063*
No	9 (2.9)	19 (5.9)	28 (5.9)	
Total	313 (100.0)	322 (100.0)	635 (100.0)	
Oral Radiology II				
Yes	229 (96.1)	303 (95.9)	602 (96.0)	$\chi^2=0.027$; 0.870*
No	12 (3.9)	13 (4.1)	25 (4)	
Total	311 (100.0)	316 (100.0)	627 (100.0)	

¹Chi-Squared test.

Table 3 - Distribution of students with and without availability of social media regarding the need for a second test for Oral Radiology I and II

Did a second test	Media availability, n (%)		Total, n (%)	p value
	Yes	No		
Oral Radiology I				
Yes	99 (31.6)	214 (68.4)	313 (100)	$\chi^2=8.100$; 0.004*
No	137 (42.5)	185 (57.5)	322 (100)	
Total	236 (37.2)	399 (62.8)	635 (100)	
Oral Radiology II				
Yes	142 (45.7)	169 (54.3)	311 (100)	$\chi^2=9.920$; 0.002*
No	184 (58.2)	132(41.8)	316 (100)	
Total	326 (100)	301 (48)	627 (100)	

¹Chi-Squared test.

Table 4 - Descriptive statistics of the means before and after a second test in relation to the availability of social media

	Minimum	Maximum	Median (interquartile range)	p value*
Oral Radiology I Grade				
With media	3.7	9.48	7.39 (1.48)	<0.001
Without media	3.46	9.24	7.1 (1.56)	
Grade after second test				
With media	3.72	9.48	7.46 (1.19)	<0.001
Without media	3.15	9.24	7.2 (1.48)	
Oral Radiology II Grade				
With media	2.41	9.63	7.06 (1.70)	<0.001
Without media	1.86	9.25	6.6 (1.70)	
Grade after second test				
With media	2.4	9.63	7.26 (1.5)	<0.001
Without media	1.86	9.25	7.04 (1.42)	

*Mann-Whitney exact test.

4. Discussion

The use of the Internet has become part of everyday life and is directly or indirectly part of the school context, where information is faster and more accessible than a few years ago. Social media, as well as contributing to educational growth, allows students, with widespread access, to participate digitally on the teaching-learning process, confirming how much the ‘social’ side this interactivity contributes to the construction of knowledge (Spallek, 2015; Arnett, 2013).

On the other hand, Cox et al. (2016) and Thorell et al. (2015) reported that dentistry courses do not include a discipline on technology that presents to students the importance of the use of social media in the teaching-learning process. Thus, students cannot be considered totally immersed in digital reality due to a lack of training. It is fundamental to study the use of social media in the teaching-learning process, not only for students to understand the importance of this tool but for them to integrate with teachers in this evolutionary perspective of education.

Our study verified that smartphones are the main way of accessing social media. This can be explained by the availability of an open Wi-Fi network at the university or the student’s own telephone network. This has also been observed by Parkinson et al. (2014) and Rung et al. (2014) who stated that, within the classroom, the smartphone is an auxiliary tool for learning. However, Robert et al. (2013) suggested that social media are a threat to the

educational experience, reducing the effectiveness of teaching. Therefore, its use must be rationally established in the teaching-learning process, especially so that students interact and actively participate in the pedagogical process, as occurred in our study, not being a threat to the educational process. However, this conflict of opinion is possible due to the various forms of assessment existing in the educational process, and the use of social media is still under debate.

The fact that most students are satisfied and access social media at least once a month, especially the Facebook page for the radiology courses, demonstrates the interest and motivation to use social media in optimizing teaching. The education model that now characterizes society, immersed in the new technologies of information and knowledge, is not based solely on classroom learning. Ninety-six percent of the students in this study suggested expanding the use of social media to other courses, which demonstrate the efficiency of this tool both in the construction of knowledge and in the socialization between students and teachers in the pedagogical process.

Education faces technology-driven changes, and educators at all levels must assume a new role within the teaching-learning process to develop critical analyses in their students, applying theories on reality or simulated experiences. With this reality, it is necessary to start a process of adaptation and inclusion of social media as an integral and participatory part of the teaching-learning process (Spallek, 2015; Thorell, 2015). In our study, in addition to teachers, students also actively participated in pedagogical practice and critical construction of knowledge, through interactive activities on social networks, as well as discussions related to both course and academic and professional life in the classroom.

Another important factor is the suggestions from the students on content to develop and improve the courses because they reflect their main needs. In the present study, there was a greater interest in clinical cases on CBCT and benign bone lesions. In the questionnaire, more posts on radiographic anatomy, fibrous-osseous lesions, and exposure errors were suggested. Also, such information can more effectively direct the activities in the classroom and with monitoring of the discipline through reviews and feedback. It is a process that transcends the classroom, which proves that social media is not only a means of digital communication but socialization among knowledge agents within the educational parameter (Dubose, 2011).

However, there have been limitations in the use of social media because the preparation of materials and postings must be monitored/managed by the teachers permanently, which requires more time in addition to class work. These difficulties were also reported by Brumini (2014) et al. and Dorup (2004) they verified the need for management of the virtual classroom and

monitoring of students' actions. A more dynamic approach in the production of didactic material is suggested with research groups and participants, whether student or teacher, producing the material weekly.

Another limitation that should be stated is regarding the questionnaires. Unfortunately, it was not possible to associate the students' satisfaction through the answered questionnaires with the grades in the subject evaluations. That is due to the fact that there was no identification in the questionnaires since it may contribute to changes in the answers due to the embarrassing, creating a bias. However, despite this limitation, it is noticeable the connection between the increase of students' grades and their satisfaction with the use of technology associated with the teaching-learning process in both courses, not detracting the results and the applied methodology.

Social media didactics is discussed by Hendricson (2012) on the need for changes in the methodology of education and the course of oral radiology. They suggest planning in four steps (called the four-step game plan). The source of the information is the starting point to substantiate the evidence and its variations, with the firm intention of elaborating on educational strategies with the intervention of the relevant academic body in the search for a differentiated pedagogy. The idea corroborates the students' consideration of the use of social media as a necessary and innovative tool for learning, which supports the idea of socialization and improvement of learning offered by these tools.

In this study, we have shown that social media, such as Facebook and Instagram, can aid in education, favoring the teaching-learning process in the oral radiology course. In studies by Thorell (2015), Dorup (2004), and Grinkraut (2014), the use of social media as an auxiliary learning and socialization tool had a relevant and positive impact on academic studies and consequently had a higher-grade point. This positive impact was also observed on our study when is verified that there was a significant decrease in the number of students who needed to take a second test when they don't get enough grade to be approved directly and a significant increase in the average scores of students who used social media as an aid to teaching and socialization.

Mattheos et al. (2012) reported on the importance of the impact of social media on the positive academic achievement of students but stresses that the quality of these learning materials must have well-defined learning objectives to ensure validity, the accuracy of use, based on evidence and the use of best pedagogical practices. In this study, the published information, as well as didactic material in the classroom and on social media, was based on scientific evidence (books and articles) and that, although each teacher has his teaching methodology, which can vary between them, it is important to

emphasize that, when used correctly, social media has a favorable impact for students and teachers (Cunningham 2014).

However, investigation of the relationship between the use of social media and academic performance presents difficulties because of the different methodologies involved in the definition and measurement of the variables of interest. Research needs to be carried out continuously, as the relationship between social networks/technology and academic performance remains largely unanswered.

Overall, an investigation of the relationships with social media has made it possible to further explore the content and continuity of learning after practical classes. This has resulted in a positive impact on the educational process overall, and we recommend the use of social media. However, further studies are needed in this dynamic and innovative pedagogical practice.

5. Conclusion

Most of the students were satisfied and suggested an expansion of social media for other courses in the dental school and most of them accessed social media on smartphones using the university network or mobile telephony. Facebook is the most used media, both for the execution of exercises and for discussions and consultation of teaching plans. It was observed in this study an improvement in the performance of students in the course of oral radiology, with an increase in the number of students approved directly in the subjects and their scores, justifying the use of social media in excellence in educational practice in higher education. The use of social media, in addition to establishing an interconnection between students and teachers in the construction of knowledge and pedagogical practice, suits as a support mechanism for the continuity of the teaching-learning process. Besides, it improves the socialization of those involved in this process, encouraging them to develop new projects.

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