RESEARCH ARTICLE

Satisfaction of pharmacy students with e-learning approach in the University of Health Sciences Casablanca, Morocco during COVID-19 lockdown

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Abstract

Objective: The aim of this study was to assess the satisfaction of pharmacy students with e-learning during the COVID-19 lockdown.   **Methods**: A cross-sectional study was conducted in the Pharmacy School of Mohammed VI University of Health Sciences of Casablanca in April 2020. An anonymous questionnaire previously validated by the pedagogical committee of the university was administered to students *via* google forms.   **Results**: A total of 154 responses were received, 122 (79.22%) were female students. The majority of students were satisfied with the general organisation (between 60.4% and 81.8% depending on the studied parameter), e-learning (63.6%), educational content (between 61% and 85.7% depending on the studied parameter), self-assessment methods (between 64.9% and 84.4% depending on the studied parameter), adaptation (63%), the involvement of teachers (83.8%), and the administration of the faculty (75.9%). Multivariate analysis showed that two factors were significantly associated with student satisfaction related to e-learning in this study. This corresponds to the level of study (*p*-value = 0.026; OR=4.009; $IC_{95\%}$ [1.176-13.663]) and the adaptation (*p*-value = 0.004; OR=3.671; $IC_{95\%}$ [1.519-8.868]). This study found that satisfaction levels were higher among third year students, which could be interpreted by the fact that they were more familiar with e-learning.   **Conclusion**: *S*tudents were mostly satisfied with e-learning during the lockdown. The experience from this study showed an advantage for other schools by the partial introduction of e-learning training as a teaching method in normal situations in order to better deal with emergency situations.

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) is one of the main pathogens that mainly targets the human respiratory system. This virus was responsible for the new coronavirus 2019 (2019-nCOV) that appeared in December 2019 in Wuhan city, a metropolis with 11 million inhabitants in the heart of China (Singhal, 2020).

The SARS-COV-2 virus, then, quickly spread to the rest of the world, which prompted the World Health Organization (WHO) to declare this disease as a pandemic on 11 March 2020 (World Health Organisation, nd; Pelmin, 2020; Wang *et al.*, 2020). Indeed, several cases have been notified in other countries such as Thailand, Japan and South Korea. The first case of death from this virus was reported on 11 January 2020 (Singhal T, 2020). Subsequently, an exponential increase in the number of deaths, as well as cases of infection, have been observed worldwide (Wang *et al.*, 2020). This induced all of the affected countries to put in place a curfew and thus oblige citizens to confine themselves at home.

The Moroccan authorities introduced a state of health emergency on 20 March 2020, from the first cases that appeared, with the lockdown of the population. The lockdown was extended four times (Anon, 2020). Thus, the Moroccan government took the necessary measures to prohibit people from leaving their homes except for absolute necessity and also prohibit any gatherings or meetings of groups of people as well as any business that can accommodate the public. Consequently, several sectors of activity were affected, including the education sector.

In the context of COVID-19, the university environment has undergone massive reforms on a global scale. Health education has also been highly affected by this emergency health situation. Therefore, faced with this global crisis, in order to allow pedagogical continuity for students and avoid a premature end of the academic year, Moroccan universities quickly switched to a model of distance education and supervision. In this respect, the Faculty of Pharmacy of Mohammed VI University of Health Sciences (UM6SS) of Casablanca, through the pedagogical e-learning platform "CANVAS" adopted by the university, switched its system of education to e-learning training. Indeed, the Faculty of Pharmacy of UM6SS has partially adopted this e-learning training since its opening in the 2017-2018 academic year, and distance education represented 50% of the total hourly volume of each module taught in the faculty. Two distance learning approaches are described in the literature: synchronous and asynchronous. The first approach involves students learning together and live such as in lectures; this allows them to acquire a certain level of commitment and a sense of community. Conversely, the asynchronous learning approach allows students, thanks to the material communicated to them, to learn by themselves and to discuss the content in forums, for example. They, thus, have time to complete their course synthesis to the detriment of community involvement (Offir, Lev & Bezalel, 2007; Watts, 2016; Chen, Kaczmarek & Ohyama, 2020).

In addition, the total and urgent switchover from face-to-face learning to distance education required mobilisation and adaptation on the part of students, teachers and also the administrative staff. In fact, the students naturally followed the approach established by the faculty, hoping that it would be as effective as face-to-face teaching. During this period of lockdown, the faculty faced some challenges related to the planning of the normal period, to work in pedagogical teams in order to ensure the continuity of the training synchronously and asynchronously, as well as accompanying the students through the forums.

In recent years, several studies have focused on evaluating the effectiveness of the implementation of e-learning as a teaching approach (Govindasamy, 2001; Gotthardt, Siegert & Schlieck, 2006; Muirhead, 2007; Popovici A & Mironov, 2015; Vitoria, Mislinawati & Nurmasyitah, 2018; Chen, Kaczmarek & Ohyama, 2020). Some works have described an appreciation of students for e-learning training as a teaching method which has been recommended by several universities around the world (Govindasamy, 2001; Martín-Blas & Serrano-Fernández, 2009). Another study carried out among nursing and medical students had shown their preference for the e-learning approach in the future (Gruner, Pottie & Archibald, 2015; Jamil, Sethi & Ali, 2016). Also, a study of pediatric cardiology students described a high level of student satisfaction with the e-learning approach (Maheshwari *et al*., 2015).

The goal of this paper is to assess the satisfaction rate of pharmacy students with the e-learning training offered during lockdown due to COVID-19 and to suitably reveal which parameters impact exactly this rate by applying some biostatistical methods such as cross tables, univariate analysis and multivariate analysis.

Methods

This is a descriptive analytical prevalence study conducted within the Faculty of Pharmacy of Mohammed VI University of Health Sciences during April 2020.

An anonymous questionnaire intended to assess the progress of the educational system established by the faculty was administered to the different students during lockdown via google forms. The questionnaire consisted of 26 elements which were grouped into six categories. So, the authors evaluated student's satisfaction with various parameters relating to the general organisation such as the weekly schedule of courses in the Faculty of Pharmacy, the fixed course schedules, the structuring of the courses and assessments on the e-learning platform "CANVAS". This platform is an open-source Learning Management System (LMS), published by Instructure Inc., in Salt Lake City (United States). Its "standard" version targets higher education institutions.

The authors were also interested in the satisfaction of the students with regard to the relevance of the recorded capsules, the posting of the PDF courses on the platform, the clarity of the educational objectives and also their appreciation for live conferences (courses, tutorials and correction of exercises).

Self-assessment was also evaluated through the student's regular response to the quizzes, the clarity

and relevance of the quiz, the number of quizzes assigned per session, the number of attempts authorized per quiz, as well as the deadline for quiz submission (48 hours per session).

The evaluation of student interactivity with teachers via the forums was also completed. The authors questioned the students on the usefulness of the forums and their regular usage of the forums made available to them as well as their appreciation for the deadline of interactivity of these forums (48 hours per session).

The authors also assessed the level of student satisfaction with e-learning training during this period, their appreciation of the teaching model during this period, as well as their degree of adaptation to follow the courses at home. Eventually, the authors assessed the student's feedback in terms of satisfaction with the degree of involvement of teachers in the quality of training and the level of responsiveness of the faculty administrative staff in relation to their requests.

Several systems have been put in place on the e-learning platform that is available to teachers and students to achieve educational continuity during lockdown through synchronous and asynchronous learning. The terms of which have been previously validated by the university's pedagogical commission. In fact, synchronous learning focused mainly on lessons or tutorials, allowing teachers and students to instantly exchange information on the content of teaching; thus, 141 live conferences were scheduled during the lockdown. As part of the asynchronous teaching, 192 narrated power-point and short videos (directed and practical courses) were produced; a forum was associated with each deposited short video in order to ensure and facilitate the reactivity between teachers and students with a total of 137 forums as well as 190 quizzes.

The data were entered into Excel and analysed through SPSS version 26.0 software. Qualitative variables were expressed in number and percentage. Qualitative variables were expressed as mean and standard deviation or median and quartile. The factors associated with satisfaction of the teaching method were studied in univariate and multivariate analyses using the binary logistic regression model (enter method). The significance level has been set at $p < 0.05$.

Results

Out of a total of 180 pharmacy students, 154 of them responded to the questionnaire (around 84%). The participating students were divided into 122 girls (79.2%) and 32 boys (20.8%). The average age was 20.4. These students were enrolled in the first, second and third years of pharmaceutical studies, which represents 15.6%, 41.6% and 42.9% of total participating students, respectively. Also, the vast majority of these students were confined with their families (93.5% *vs* 6.5%) (Table I).

Table I: Demographic data

Categories	n (%)	Mean ± standard deviation
Gender:		
Male	32 (20.8)	
Female	122 (79.2)	
Age (year):		20.8 ± 2.8
Level of study:		
First year	24 (15.6)	
Second year	64 (41.6)	
Third year	66 (42.9)	
Containment mode:		
Alone	10 (6.5)	
With family	144 (93.5)	

The authors were first interested in evaluating the student's satisfaction with the general organisation proposed in terms of weekly planning, fixed schedules as well as the arrangement of courses and assessments on the "CANVAS" educational platform. The students were satisfied with the volume of teaching offered (60.4%), the timetables set for distance education (75.3%) as well as the structuring of the courses and assessments on the e-learning platform (81.8%). The authors also assessed the relevance of the educational materials offered to students during the lockdown and their contribution to this distance learning approach (Table II).

Table II: Student satisfaction level with the general organisation, educational content and involvement of teachers and administrative staff during lockdown

	Very satisfied n (%)	Satisfied n (%)	Moderately satisfied n (%)	Not at all satisfied n (%)
Weekly schedule of courses	11 (7,2)	82 (53,2)	56 (36,4)	5 (3,2)
Fixed course schedules	17 (11)	99 (64,3)	30 (19,5)	8 (5,2)
Structuring of the courses and assessments on the e-learning platform	23 (14,9)	103 (66,9)	25 (16,2)	3 (2)
Clarity of the educational objectives	9 (5,8)	96 (62,3)	45 (29,2)	4 (2,6)
Relevance of the recorded capsules	13 (8,4)	81 (52,6)	50 (32,5)	10 (6,5)
Posting of the PDF support courses	41 (26,6)	91 (59,1)	21 (13,6)	1 (0,7)
Usefulness of lectures	35 (22,7)	76 (49,4)	33 (21,4)	10 (6,5)
Usefulness of tutorials	45 (29,2)	76 (49,4)	32 (20,8)	1 (0,7)
Content of exercises and their correction by teachers	24 (15,6)	84 (54,6)	38 (24,7)	8 (5,2)
Involvement of teachers in the quality of training	38 (24,7)	91 (59,1)	24 (15,6)	1 (0,7)
Responsiveness of the administration to requests	29 (18,8)	88 (57,1)	31 (20,1)	6 (3,9)

Indeed, capsules of 20 to 30 minutes were recorded by the teachers of the faculty for each session and made available to students according to the schedule communicated. The results of the survey showed that the students were satisfied with the relevance and the quality of these educational materials offered (61.0%), the clarity of the educational objectives (68.1%), as well as the online publication of the PDF support course (85.7%). In addition, the feedback from students showed that the lectures and "live" tutorials were also very useful to them during this lockdown period, with a satisfaction percentage of 72.1% and 78.6% for the lectures and tutorials, respectively. As part of these tutorials, professors published a week before the live tutorial session along with a series of exercises to which the students had to respond, and the correction was then organised during the tutorial session (Table II).

According to the results of the questionnaire, the percentage of students who expressed their satisfaction with the content of the exercises and with their correction was 70.2%. In addition, students were also asked about the possible need for other types of documents or additional media during this lockdown period. The results showed that 76% of the students did not express any particular need for documents. Finally, the students expressed their satisfaction with the involvement of teachers and the responsiveness of the Faculty of Pharmacy administration to their requests with percentages of 83.8% and 75.9%, respectively (Table II).

Self-assessment methods offered to students were also surveyed through the frequency of student's responses to quizzes submitted, the clarity and relevance of the quiz as well as the number of quizzes assigned per session. The evaluation showed that all of the students answered the quizzes, with 89.6% of students who tried to answer all of the questions proposed. In addition, students seemed to be satisfied with the clarity and relevance of the quizzes (64.9%) as well as the number of quizzes assigned for each online course session (84.4%). The number of attempts allowed per quiz would be satisfactory for around 80% of the students. However, the majority of students (53.3%) were dissatisfied with the deadline for quiz submission set at 48 hours by the faculty (Table III).

This study indicated that out of 154 students, 48.7% of them declared that they often or always use the forums against 51.3% of the students who rarely or never use it. However, the usefulness of this exchange forum is expressed by the majority of students (55.8%). Also, 60.4% of students said that the period of interactivity in the forum (48 hours/session) was sufficient to interact with the teachers (Table III).

Finally, the authors assessed student's satisfaction with distance learning as well as their adaptation during the lockdown. The results showed that 63.6% of the students were satisfied with distance learning, against 36.4% who were a little or not satisfied. Additionally, 75.3% of the students expressed their satisfaction with the teaching model proposed by the faculty, against 24.7% who were a little or not satisfied with this teaching model. These results are very close to those of the assessment of the adaptation of students during the lockdown. In fact, 63% of students declared an easy or fairly easy adaptation compared to 37%, for whom adaptation was difficult during the lockdown (Table III).

Table III: Student satisfaction level with self-assessment methods, usefulness of forums, distance learning approach as well as adaptation during lockdown

	Very satisfied n (%)	Satisfied n (%)	Moderately satisfied n (%)	Not at all satisfied n (%)
Clarity and relevance of the quizzes	19 (12,3)	81 (52,6)	51 (33,1)	3 (2)
Number of quizzes	31 (20,1)	99 (64,3)	24 (15,6)	0 (0)
Number of attempts allowed per quiz	24 (15,6)	71 (64,1)	46 (29,9)	13 (8,4)
Deadline for quiz submission (48h)	23 (14.9)	49 (31.8)	76 (49.4)	6 (3.9)
Usefulness of exchange forums	11 (7,1)	75 (48,7)	55 (35,7)	13 (8,4)
Period of interactivity in the forum	9 (5,8)	84 (54,6)	39 (25,3)	22 (14,3)
General appreciation with distance learning	19 (12,3)	79 (51,3)	52 (33,8)	4 (2,6)
Teaching model	25 (16,2)	91 (59,1)	35 (22,7)	3 (2)
Adaptation to follow the lessons at home	24 (15,6)	73 (47,4)	54 (35)	3 (2)

The authors carried out univariate and multivariate analyses to determine the factors that are at the origin of the general student's appreciation of e-learning training during the lockdown. The results of the univariate analysis showed that the factors associated with the satisfaction of students with e-learning education were: the level of study (p=0.004; OR=4.375; $IC_{95\%}$ [1.599-11.968]), the weekly course schedule (p<0.001; OR=3.695; $IC_{95\%}$ [2.035-6.71]), the relevance of the sound courses (p<0.001; OR=3.089; $IC_{95\%}$ [1.689-5.65]), the clarity of the educational objectives (p<0.001; OR=3.089; $IC_{95\%}$ [1.689-5.65]), the clarity and relevance of the quizzes (p=0.027; OR=1.756; $IC_{95\%}$ [1.065-2.897]), the adaptation to follow the lessons at home during lockdown (p<0.001; OR=4.75; $IC_{95\%}$ [2.594-8.697]), the involvement of teachers in the quality of training (p<0.001; OR=3.357; $IC_{95\%}$ [1.839-6.128]) and finally the involvement of the administration of the faculty (p<0.001; OR=3.213; $IC_{95\%}$ [1.863-5.54]).

However, in the multivariate analysis, only two factors were associated with student satisfaction with e-learning training during the lockdown. It was 1) the level of study (p=0.026; OR=4.009; $IC_{95\%}$ [1.176-13.663]); and 2) the adaptation, which means the ability of students to take classes at home (p = 0.004; OR=3.671; $IC_{95\%}$ [1.519-8.868]). So the satisfied students were those who adapted well to the lockdown and were third year students, as they were mostly used to the e-learning training that was partially implemented by the Faculty of Pharmacy three years ago (Table IV).

As for the main strong and weak points of this teaching model, the students evoked, for the strong points, that it allowed them to have a good pedagogical continuity during the lockdown period and that the model was motivating and of good quality. It also allowed students to manage their time at their convenience as the sound courses and quizzes helped the students stay up to date, they were efficient and interactive, ensured regularity of communication with the teachers and the administration of the faculty, had access to home lessons, the possibility to spend time with family, it allowed students to develop a certain autonomy through self-learning, and it was less stressful. Concerning the main weaknesses of this teaching model according to the students: there was a decrease in interactivity between teachers and students as well as between students themselves compared to face-to-face courses, no access to the correction of quizzes, obligation to follow the fixed timetables that were also overly busy and concern about the modalities of the controls and exams. They would also have liked to have more live lectures and to have been provided more time to understand the lessons alone. Students experienced a decrease in motivation, they did not like the changeover of practical work in the digital form and were faced with internet connection problems.

Table IV: Univariate and multivariate analyses of the factors associated with student satisfaction with the proposed e-learning training: A binary logistic regression model

| | Negative satisfaction | Positive satisfaction | Univariate analysis | | | | Multivariate analysis | | |
| | n(%) | n(%) | p | OR | $IC_{95\%}$ | | p | Adjusted OR | $IC_{95\%}$ | |
					Inf	Sup			Inf	Sup
Level of study: - First year	13 (54.2)	11 (45.8)		1				1		
- Second year	28 (43.8)	36 (56.3)	0.353	1.57	0.606	4.065	0.053	3.156	0.987	10.088
- Third year	15 (22.7)	51 (77.3)	**0.004**	4.375	1.599	11.968	**0.026**	4.009	1.176	13.663
Gender : - Male - Female	41 (33.6)	81 (66.4)	0.168	1 1.743	0.792	3.839	0.351	1 1.594	0.598	4.247
Containment mode: - Alone - With family	52 (36.1)	92 (63.9)	0.805	1 1.179	0.318	4.372	0.219	1 2.753	0.547	13.85
Weekly course schedule	20 (21.5)	73 (78.5)	**<0.001**	3.695	2.035	6.71	0.076	2.16	0.922	5.063
Relevance of the sound courses	25 (26.6)	69 (73.4)	**<0.001**	3.089	1.689	5.65	0.14	1.93	0.806	4.617
Clarity of the educational objectives	28 (26.7)	77 (73.3)	**<0.001**	3.089	1.689	5.65	0.242	1.766	0.682	4.572
Relevance of tutorials	34 (31.5)	74 (68.5)	0.076	1.49	0.959	2.316	0.847	1.101	0.415	2.922
Clarity and relevance of the quizzes	29 (29)	71 (71)	**0.027**	1.756	1.065	2.897	0.843	1.095	0.445	2.695
Usefulness of forums	29 (33.7)	57 (66.3)	0.094	1.464	0.937	2.287	0.975	1.014	0.429	2.399
Adaptation to follow the lessons at home	21 (21.6)	76 (78.4)	**<0.001**	4.75	2.594	8.697	**0.004**	3.671	1.519	8.868
Involvement of teachers in the quality of training	39 (30.2)	90 (69.8)	**<0.001**	3.357	1.839	6.128	0.437	1.675	0.456	6.153
Responsiveness of the administration to requests	33 (28.2)	84 (71.8)	**<0.001**	3.213	1.863	5.54	0.433	1.534	0.527	4.467

n: number of students; %: percentage; p: p-value; OR: Odds Ratio; Inf: Inferior; Sup: Superior; $IC_{95\%}$: 95% Confidence Interval, 1 represents the reference group CI.

Discussion

In this study, the authors were interested in the overall perception of pharmacy students towards e-learning during lockdown due to COVID-19. Several parameters were thus evaluated. The results of the survey showed that the majority of students were satisfied with the general organisation, e-learning, educational content, self-assessment methods, adaptation, as well as the involvement of teachers and the administration of the faculty. However, the results also indicated that the majority of students were dissatisfied with the deadline of quiz submission and also that they rarely or never used online forums. The satisfied students were those who adapted well to lockdown and were mainly third year students. These results go hand in hand with those of Yilmaz in 2017, who showed that the preparation for online learning of students was linked to their satisfaction and their motivation when performing academic tasks in the flipped classroom (Yilmaz, 2017). In addition, student satisfaction with sound courses during the lockdown was in accordance with the study of Münch-Harrach and authors in 2013 who showed that audio podcasts have been used by the medical students extensively and have also been evaluated very positively by non-student listeners (Münch-Harrach, Kothe & Hampe, 2013). Moreover, podcasts are already being used in medical school curricula (Harvard Medical School, nd; Boulos, Maramba & Wheeler, 2006; Singh, Alam & Matava, 2016).

Regarding the lack of regularity relative forums, this may be due to the fact that students would have preferred to ask their questions on "live" to the teachers or also because of limitations in communication skills that may limit student participation as well as difficulties in logistics as described by Simpson and authors (2008). Or also due to a need for a moderator/tutor to better manage forums and then encourage user participation as described by Ortega-Morán and the authors (2020).

Regarding the dissatisfaction with the deadline of quiz submission, this can be explained by the fact that the

students found difficulties in understanding the questions, or that the questions were not directly related to the capsule submitted online, or also due to the fact that items contained flaws and were written at the knowledge/comprehension level as partially suggested by Larson and authors (2009) and Janzen and authors (2019).

With regard to the factors behind the difficult adaptation of some students to follow home lessons, this may be due to depression, an environment that is not suitable for studying and finally, internet connection problems as described by "undergraduate" and "postgraduate" students in India (Kapasia *et al.*, 2020).

Among the advantages of distance learning are convenience and accessibility; as to the limits, the authors can cite inefficiency and difficulty of maintaining academic equality (Mukhtar *et al.*, 2020). According to teachers and students, distance education had encouraged student-centeredness during lockdown due to COVID-19 (Mukhtar *et al.*, 2020). However, the majority of recently published studies during lockdown due to COVID-19 described students' dissatisfaction with e-learning training imposed and thus had a preference for face-to-face teaching (Owusu-Fordjour, Koomson & Hanson, 2020; Zhang *et al.*, 2020). Indeed, many institutions were not well prepared for the e-learning challenge. Schools of Pharmacy were no exception, as they were not ready for a disruptive and complete transition in curriculum delivery (Qandil & Abdel-Halim, 2020). The experience of the fresh Faculty of Pharmacy showed the advantage that can be brought by the partial introduction of e-learning training as a teaching method in normal situations to better deal with emergency situations.

A recent paper has also presented some instructional strategies to improve student focus and engagement in learning with the goal of ensuring a smooth transition to online learning (Bao, 2020). Among the proposals mentioned by the author are the development of emergency preparedness plans by switching to an online education mode which would require adapting computer servers to be able to host such a large scale of new users. Due to the possible overload of the usage of these servers and therefore a possibility of stopping their operation, professors must always have alternative plans for each online course and inform the students in advance. In addition, they should always divide the content of the course planned face-to-face into several sound capsules corresponding to the different chapters of the course. Finally, the progress of online education and its learning effectiveness is largely dependent on students' active learning outside the classrooms. So, teachers should innovate and diversify homework

methods to stimulate students' active learning outside the classrooms (Bao, 2020).

Students' clinical practice was also affected during this COVID-19 period, and universities have thus sought mechanisms to ensure pedagogical continuity. The paper written by Roskvist's and the authors (2020) described the e-learning programme components they offered, which was manifested in three components: asynchronous discussion forums, a symposium facilitating social interactions and teacher presence, and a portfolio facilitating personal goal aspects. Another study reported the learning efficiency of human anatomy using the Zoom video conferencing platform (Zoom Video Communications, Inc., San Jose, CA) in Singapore (Srinivasan, 2020). Furthermore, Zingaretti's (2020) paper presented some tools that can be reliable solutions to improve the training of plastic residents, mainly during the COVID-19 pandemic. Among these tools, there is the Touch Surgery application available on smartphones and tablets, which gives the possibility to watch real and virtually designed surgical videos, which are interactive and provide students with the possibility to check what they have learned through tests administered after virtual classes. Moreover, the academic user-friendly touch screen table "Anatomage" can be used by both medical students and residents to learn human anatomy and to master surgical anatomy (Zingaretti *et al.*, 2020). In addition, the diversification of learning activities would facilitate the engagement of students since they were raised with technology. The ability to learn and revise at your own pace, with no time or place required, leads to better educational prospects (Gupta & Gupta, 2016; Rajhans *et al.*, 2020).

One of the limitations of this study is that questions assessing students' feedback on digitised practical work were not introduced in the questionnaire. This was due to the fact that the practical work was scheduled for the end of the semester, and it was believed that the lockdown would have come to an end before this and that students would have returned to face to face teaching. Another limitation of this study is that the presence of only three promotions of students within the Faculty of Pharmacy has only existed since the 2017/2018 academic year.

In application of this work and with the objective of better coping with possible emergency situations, the authors recommend that other schools of pharmacy to:

1) Acquire a digital educational platform to be ready to switch completely to distance education if necessary.

2) Train teachers in digital pedagogy.

3) Train students in educational platforms.

4) Include e-learning in the curriculum to complement teaching and learning in the classroom in order to

better cope with emergency situations and also to develop students' self-learning capacities.

5) Create a permanent exchange between teachers and students through discussion forums available on digital educational platforms.

6) Mix synchronous teaching (for tutorials) and asynchronous teaching (for lectures).

7) Introduce a "learning methodology class" into the curriculum that will allow students to acquire the tools and skills necessary for online learning.

8) Increase students' self-assessment tests so that they can better follow online courses. The distance learning experience is an increasingly used educational practice that presents opportunities in emergency situations. The distance learning approach can be further developed by integrating more and more interaction between students and teachers, for example: integrating more workshops in small groups as well as serious online games in which the teacher could divert entertainment games for educational purposes. Indeed, the more attractive the content, the better learners retain information. It would also be interesting to develop virtual practical classes. Inviting students to prepare oral presentations on different themes related to the curriculum could better engage them and also develop their sense of responsibility.

Finally, it would also be interesting to assess the internship courses for student pharmacists during health emergencies in order to identify the skills that are acquired or improved.

Conclusion

The pharmacy students were mostly satisfied with e-learning during the lockdown. The main reasons for this satisfaction were the level of study as well as their ability to adapt since their introduction to e-learning. Therefore, this current study recommends that students should be introduced to e-learning platforms to supplement classroom teaching and learning during "normal situations" in order to better deal with emergency situations.

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Conflicts of interest

The authors declare no conflict of interest.

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